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MAY 1971

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MECCANO® Magazine

MAY 1971 VOLUME 56 NUMBER 5

Meccano Magazine, founded 1916.

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FRONT COVER

Staff artist Peter Swann's impression of our full-size plan model, the very fast electric round-the-pole model details of which are on pages 232-5.

NEXT MONTH

A feature on sand-yachts, with plans for two models, makes a somewhat unusual subject for next month. Notes and pictures of some of the new items at Nuremberg Toy Fair, a simple Meccano articulated lorry, and of course the pylon head for electric aircraft flying, are among other articles on the schedule.

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WORLD-WIDE
MECCANO

THE ITALIAN MECCANO MAGICIAN

The mystery of the ever-changing Dinky Toys!



The Meccano Magician is one of the most original and entertaining Meccano Models ever built.

Its use of Meccano pieces is so cunningly clever that before your very eyes it changes two Dinky Toys into entirely different models! Built by Italian model-making genius Giuseppe Servetti, its overall height is 42". In front of the Magician is a Meccano-built table which is some 26" wide by 32" deep by 7½" thick.

How does it work?

The two Dinky Toys on the apparently solid table are in fact standing on moveable platforms (Meccano 5½" x 2½" flat plates) which come from inside the table. When the boxes in the Magician's hands are lowered sufficiently to hide the Toys, the platforms sink into the table and revolve on an internal turntable until two new platforms with different models are in position. These are then raised until the holes in the table are filled, at which point the Magician lifts his arms to reveal the two new Dinkys. There are eight platforms in all, each carrying a different Dinky model, and the whole operation is completely automatic.

Throughout all stages the Magician continuously opens and closes his mouth and moves his head from side to side.

Power for all movements comes from 2 Meccano 3-12 volt D.C. motors with a 6-ratio gear box and one mains motor inside the table which drives the Magician's head. The various movements are governed by three separate Meccano-built gearboxes. The intricate gearboxes and linkages governing all movement will operate continuously for long periods—a tribute to the tremendous skill of the designer.

No matter how simple or complicated they are, we should like you to write about any models you've made which you think would be of interest to other Meccano enthusiasts around the world. Please send photographs and descriptions to Meccano Tri-ang Limited, Binns Road, Liverpool L13 1DA.



THE WORLD'S GREATEST CONSTRUCTIONAL TOY

Announcing the BiC Regd. Trade Mark National Model Making Championship

If you have a few used ball pens and a creative mind . . . prove it!

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And here is the answer!

Because Bic Crystals write first time every time there are far more sold in the U.K. than any other model. In fact, each year a Bic Crystal is sold for every man, woman and child in the Country with a few million more for good luck.

Where do they go to?

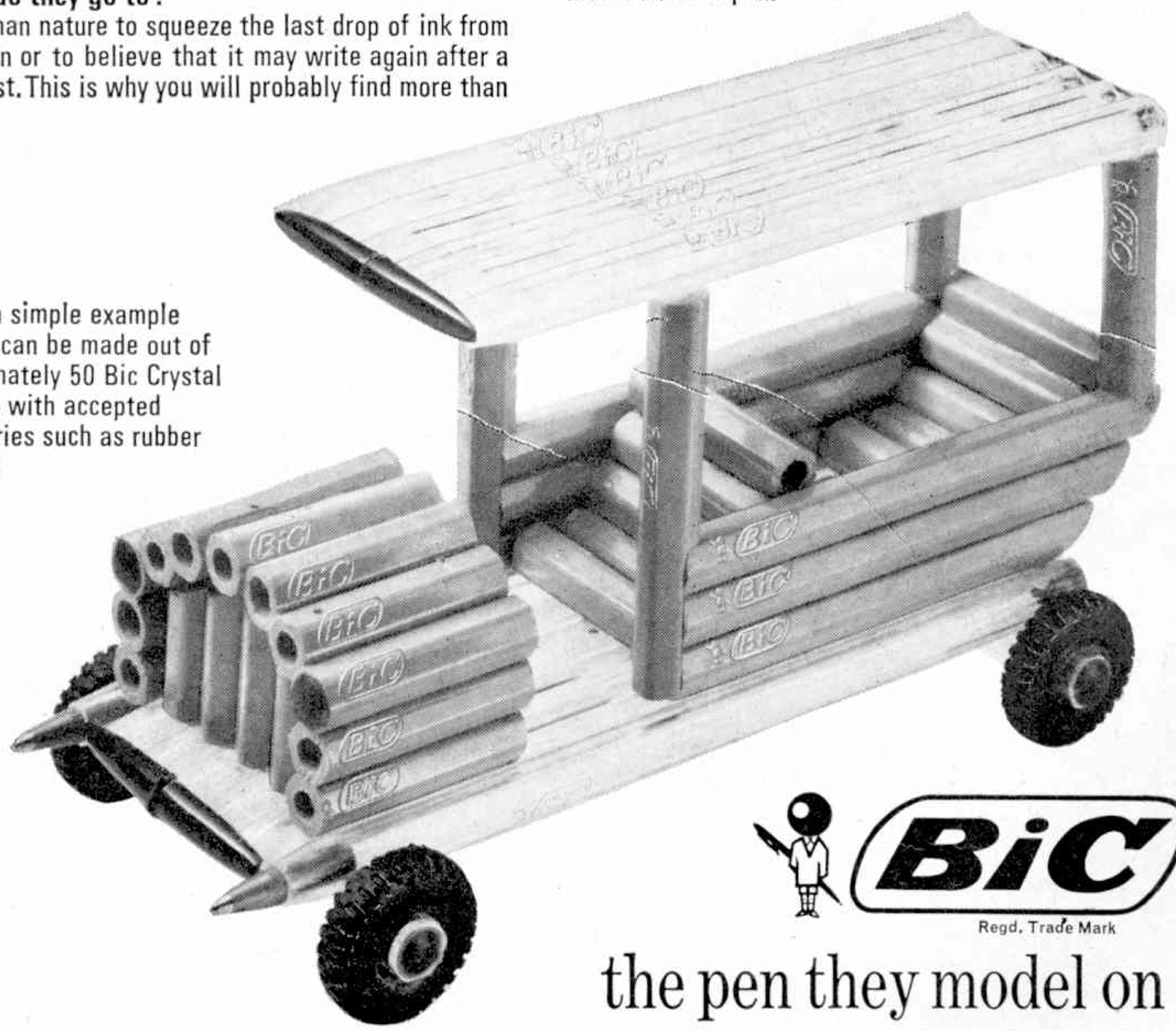
It is human nature to squeeze the last drop of ink from a ballpen or to believe that it may write again after a short rest. This is why you will probably find more than you expect in your own home. In offices and factories you should find them by the hundred.

All you have to do . . .

. . . is to start collecting used Bic Crystal medium and fine ballpens now so that you may complete a suitable model and enter the competition.

There will be cash prizes for the best models every three months, both senior and junior and finally the best modeller overall at the end of the year will be awarded a further cash prize of £250 and the handsome Bic championship trophy.

Take your time, read the rules overleaf, then send your model with coupon.



This is a simple example of what can be made out of approximately 50 Bic Crystal ballpens with accepted accessories such as rubber wheels!

BiC Regd. Trade Mark

the pen they model on

BiC

Regd. Trade Mark

Model Making Competition

Start collecting your pens now but—
one word of warning—

make sure they are genuine Bic Crystal Medium or Fine Point ballpens carrying the Bic Registered Trade Mark because only these are eligible

RULES

1 The participants of the Bic Model Making Competition will be judged on their originality and technical model-making expertise.

2 The competition will be divided into two parts:
Junior: Participants, either sex, under the age of 16 at time of entry. Within this group no heat or flame technique for moulding may be used, but any other form of adhesion may be utilized.
Senior: Participants, either sex, over 16. Within this group, any form of adhesion is accepted. Heat to bend or shape the pens may be used.

3 Entries for the competition must be accompanied by the official entry form below.

4 Any number of BIC Ballpen barrels may be used. All models must be constructed utilising any part of BIC Crystal Fine (Yellow) and Medium (Transparent) ballpens.

5 BIC Crystal barrels may be cut to shape or size, but each barrel must clearly show the Registered trade name BIC (as imprinted on the barrel). Where models are moulded by heat, there must be at least 10 parts where the BIC Registered trade mark is clearly shown.

6 Accessories other than BIC parts may be used *only* to make the model functional or to infer final design, i.e., wheels, transfers, cotton, string, paper, etc.

PRIZES

7 Prizes will be awarded to competitors who, in the opinion of the panel of judges, produce the most creative, unusual or skilful entry for each quarterly competition.

8 **Quarterly prizes will be awarded as follows:**
Senior section—first prize £25.
second prize £15.
third prize £10.
10 consolation prizes of £5 each.
Junior section—first prize £15.
second prize £10.
third prize £5.
10 consolation prizes of £2 each.

9 Models winning any of the three prizes in either Junior or Senior levels of any of the quarterly competitions will automatically be entered in the BIC National Championship Competition and the individual competitor whose model is selected by the judges to be of greatest merit will receive an additional cash prize of £250 together with the 1971 BIC Model-Making Trophy.

10 **Entrants should send their models to:**
The BIC Model-Making Competition,
c/o Montague House, 23 Woodside Road,
Amersham, Bucks.
Should a model be considered delicate for conventional postage, then a photograph (colour or black and white) may be despatched beforehand. This will be used for preliminary judgement. Entry forms should be clearly attached to each model or photograph entered.

11 No responsibility can be taken for the damage in transportation of any model received. Judges will, however, take into account such unfortunate circumstances and the model will still be eligible for participation within the contest.

12 Should participants require a model returned, then return postage must be included by way of enclosing the appropriate stamps.

RESULTS

13 The 1971 competition will be held during 3-monthly periods and results will be announced during August 1971, November 1971, February 1972.

14 Participants should ensure that their models are despatched to arrive by 1st June (for August judging), 1st September (for November judging) and 1st December (for February judging).

15 Any model received after this date will not be eligible for the relevant Quarter but will qualify for the next Quarter's competition.

16 Any prize winning model will become the property of Biro-Bic Ltd., and may be used in any way they think fit.

17 Employees, relatives or direct associates of Biro-Bic Ltd., Model and Allied Publications Ltd., as well as their advertising agents will not be eligible for this competition.

18 The decision of the Judges is final and no correspondence can be entered into in relation to prizes awarded or decisions made.

I understand and abide by the Rules

Name .....
(BLOCK LETTERS PLEASE)

Address .....

.....

..... Age .....

WHERE DID YOU COLLECT YOUR BIC PENS? .....

MM 2

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PUBLICATIONS

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HANDBOOKS



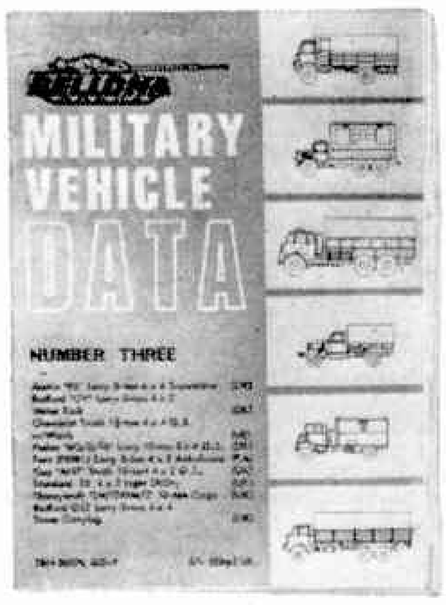
Handbook No. 1. GERMAN SELF-PROPELLED WEAPONS
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Handbook No. 2. GERMAN SEMI-TRACKED VEHICLES
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MILITARY VEHICLE DATA



5 Adler '3Gd' Car Medium 4x2 Kfz 12 (GE); Daimler-Benz 'G5' Car Medium 4x4 (GE); Daimler-Benz 'G3a' Truck light 6x4 (GE); Steyr-Daimler-Punch '1500 A' Truck Light 4x4 (GE); Daimler-Benz 'L3000 S' Truck Medium 4x2 (GE); Adam Opel 'Blitz 3t' 3,6-670 A Truck Medium 4x4 (GE); Faun 'ZR' Tractor wheeled heavy 4x2 (GE).

6 Chevrolet Truck 1½-ton 4x4 Telephone Maintenance (US); Leyland 'Hippo' 10-ton 6x4 Printing (UK); Ford 'WOT 6' Lorry 3-ton 4x4 G.S. (UK); Morris 'CDF' Lorry 30-cwt 6x4 G.S. (UK); Standard 14 4x2 Light Ambulance (UK); Bedford 'RL' Lorry 3-ton 4x4 G.S. Cargo (UK); Chevrolet (C30) Truck 30-cwt 4x4 Slave Battery (CA); Humber 4x4 Heavy Utility (UK); Morris Truck 8-cwt 4x2 F.F.W. (UK).

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23 Bundeswehr main battle tank—Kampfpanzer 'Leopard', Prototype I (Group A), Prototype II (Group A), Production Kampfpanzer 'Standard'—Leopard; Recovery and Engineer Vehicles, Bergepazner 'Standard' and Pionierpazner 'Standard' J962/70.

24 The World War I French Renault FT 17 fighting tank that shaped the future development of AFV, in service from 1918 to 1945. This most important tank is given detailed coverage. Drawings include the Berliet turret, the normal riveted octagonal turret, with machine gun and 37mm cannon, also included version mounting the 75mm cannon. Drawings and text by Christian Henri Tavard. The well-known Italian Medium tank Carro Amato M 11/39—1939/41, which was the forerunner of the M 13/40. Drawings and text by Phil Dyer.

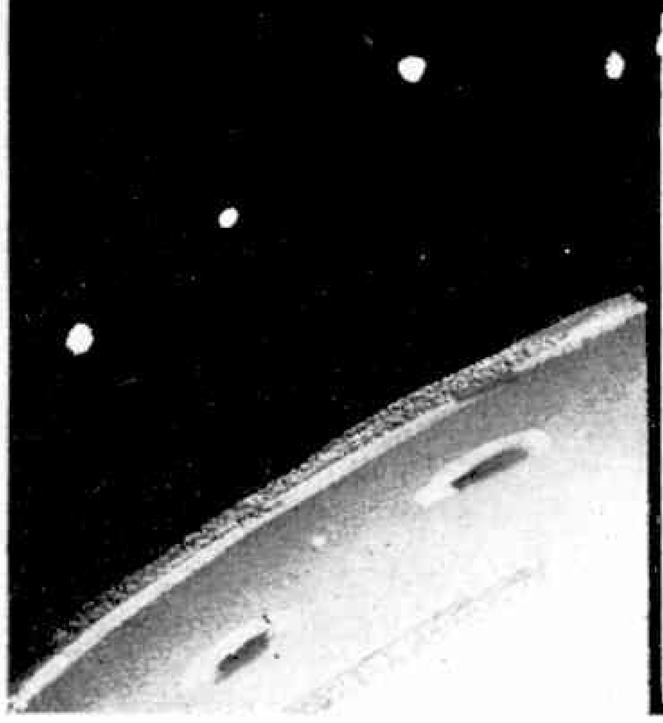


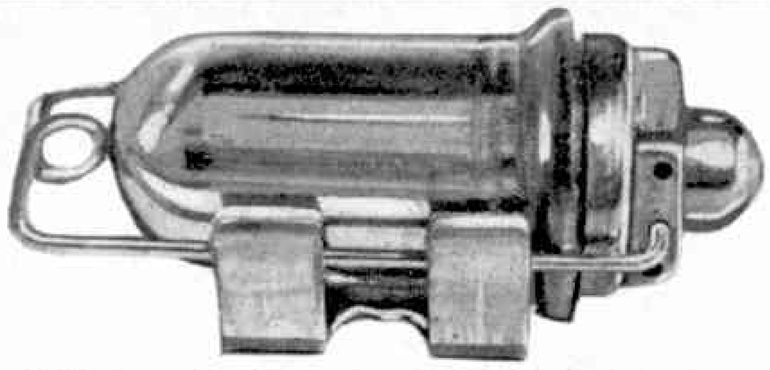
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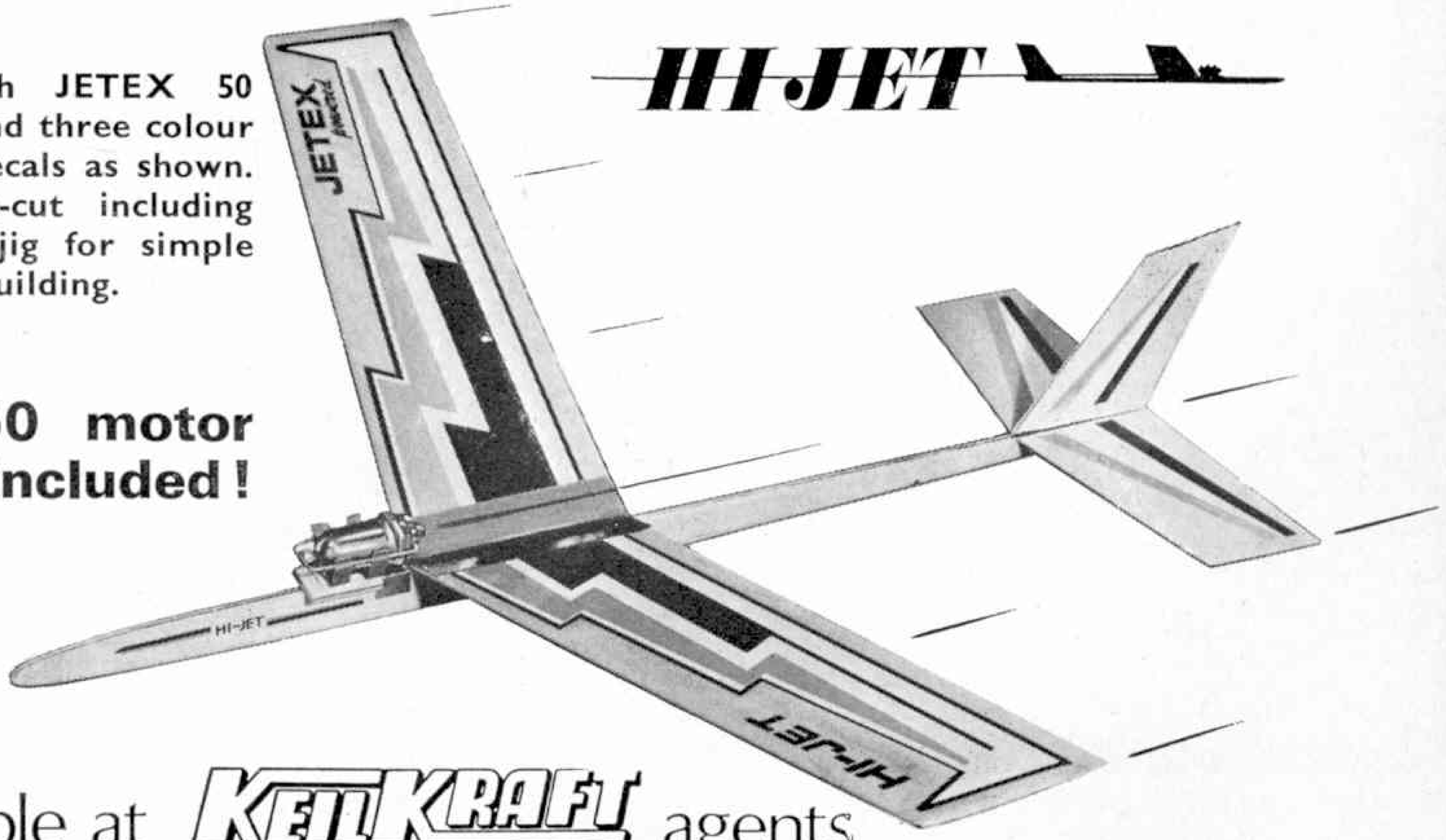
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Wingspan 21".

JETEX 50 motor & fuel included! at £1.25



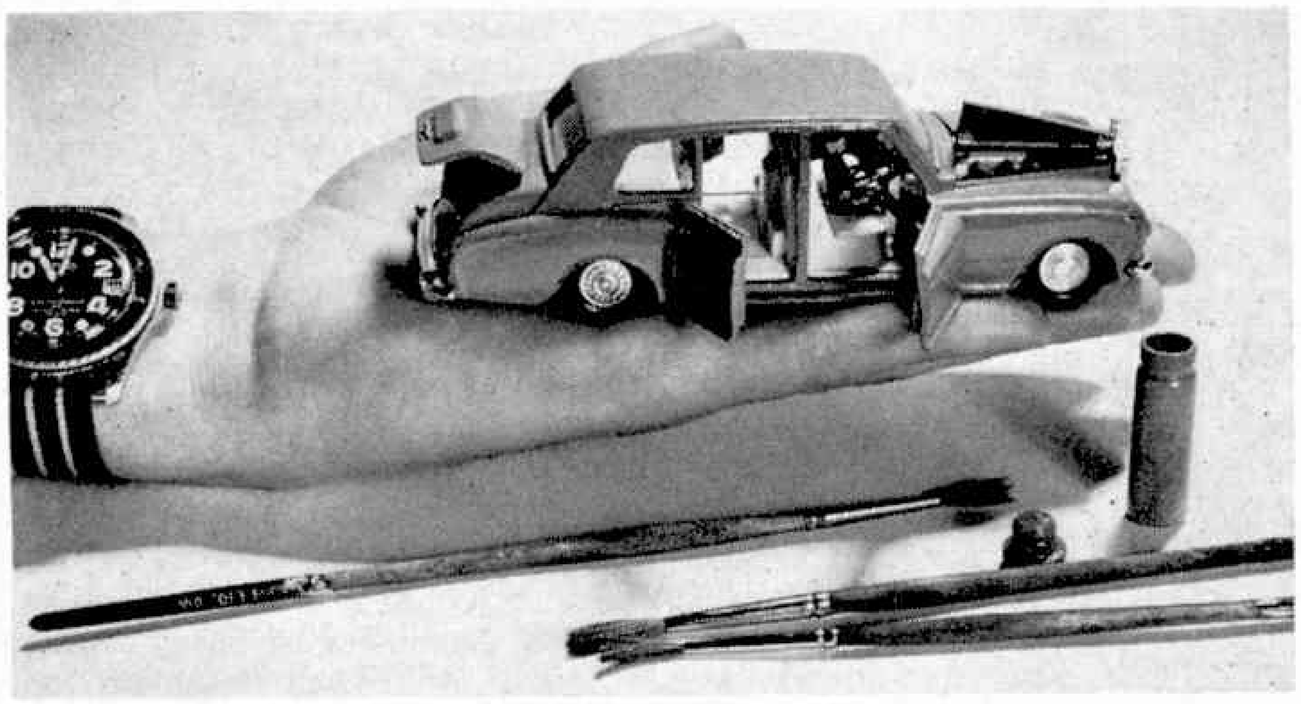
Obtainable at KEILKRAFT agents



ON THE EDITOR'S DESK

One of the most interesting developments for some time is the introduction of Dinky vehicles in kit form. These kits will be of especial appeal to the many modellers who build " specials " from standard Dinkys, but they will also intrigue many Dinky collectors who have never previously felt the urge to make something up themselves. There is a great deal more pride of ownership in a model one has made and painted, and we predict a great future for this innovation.

The pictures on this page show the attractive results that can be achieved, and the sample kits in our office have produced considerable eagerness on the part of other magazines' staff to build them up. Full marks to whoever thought up the idea at Meccano Ltd.



Competition Entry Form

The vehicle illustrated is.....

.....

Name..... Age.....

Address.....

.....

.....

Competition

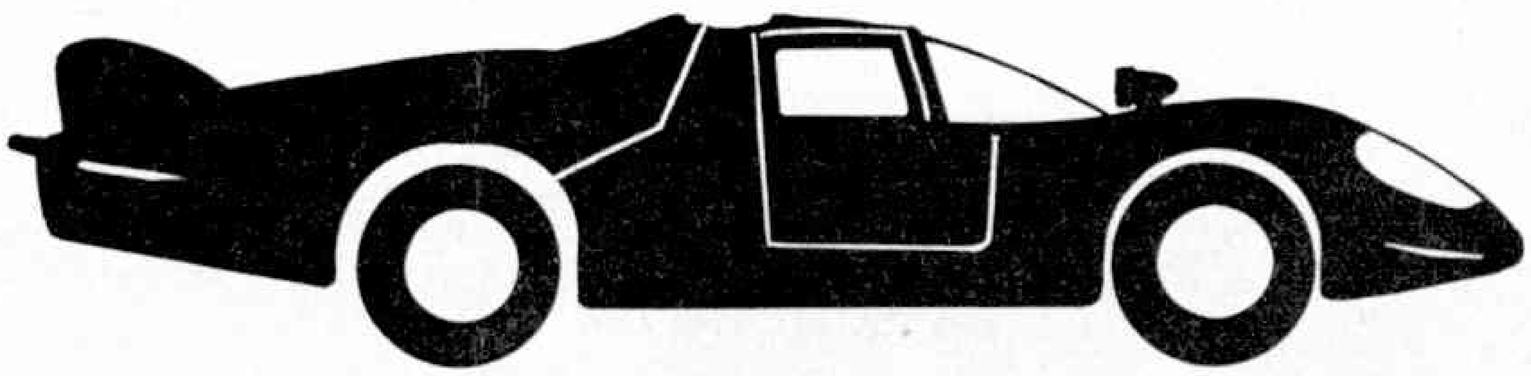
The postal strike is just ending as this, the last page of this month's issue, is being prepared. We are thus slipping in a Car Outline Competition silhouette. Just jot the name of the car on the form above, cut out, and send to Meccano Magazine Comp., 13-35 Bridge Street, Hemel Hempstead, Herts. If you don't want to cut the magazine, jot it down on a postcard but do remember to put your name and address. The first 50 correct entries received will be sent a model of the vehicle.

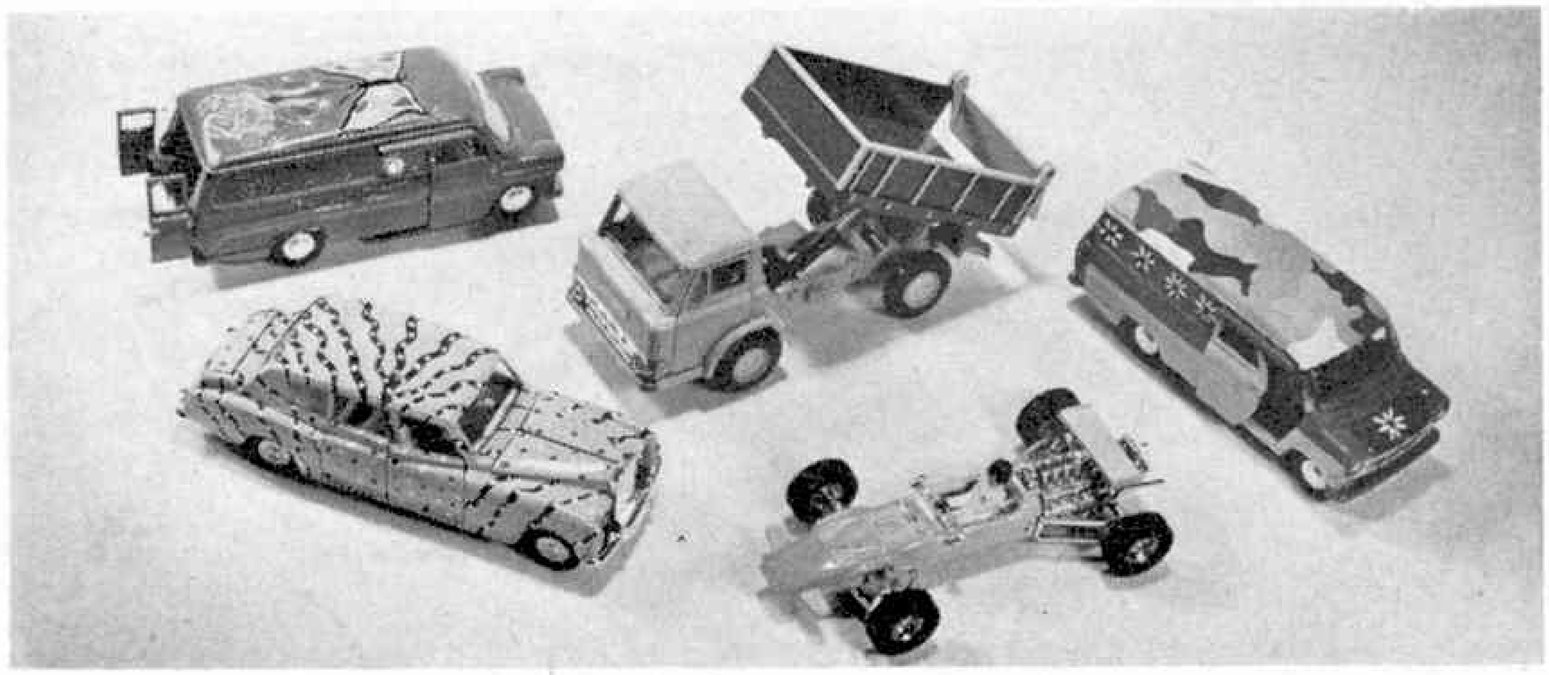
A notice appears in this issue regarding the Meccano Competition, the closing date of which has been extended by one month.

We regret that the strike has affected our intended contents, and two articles have been held over till next time. We must also apologise, especially to subscribers, for any irregularity in the supply of your favourite magazine; now that work is being resumed, we hope that things will be back to normal in short order, certainly by the time you read this.

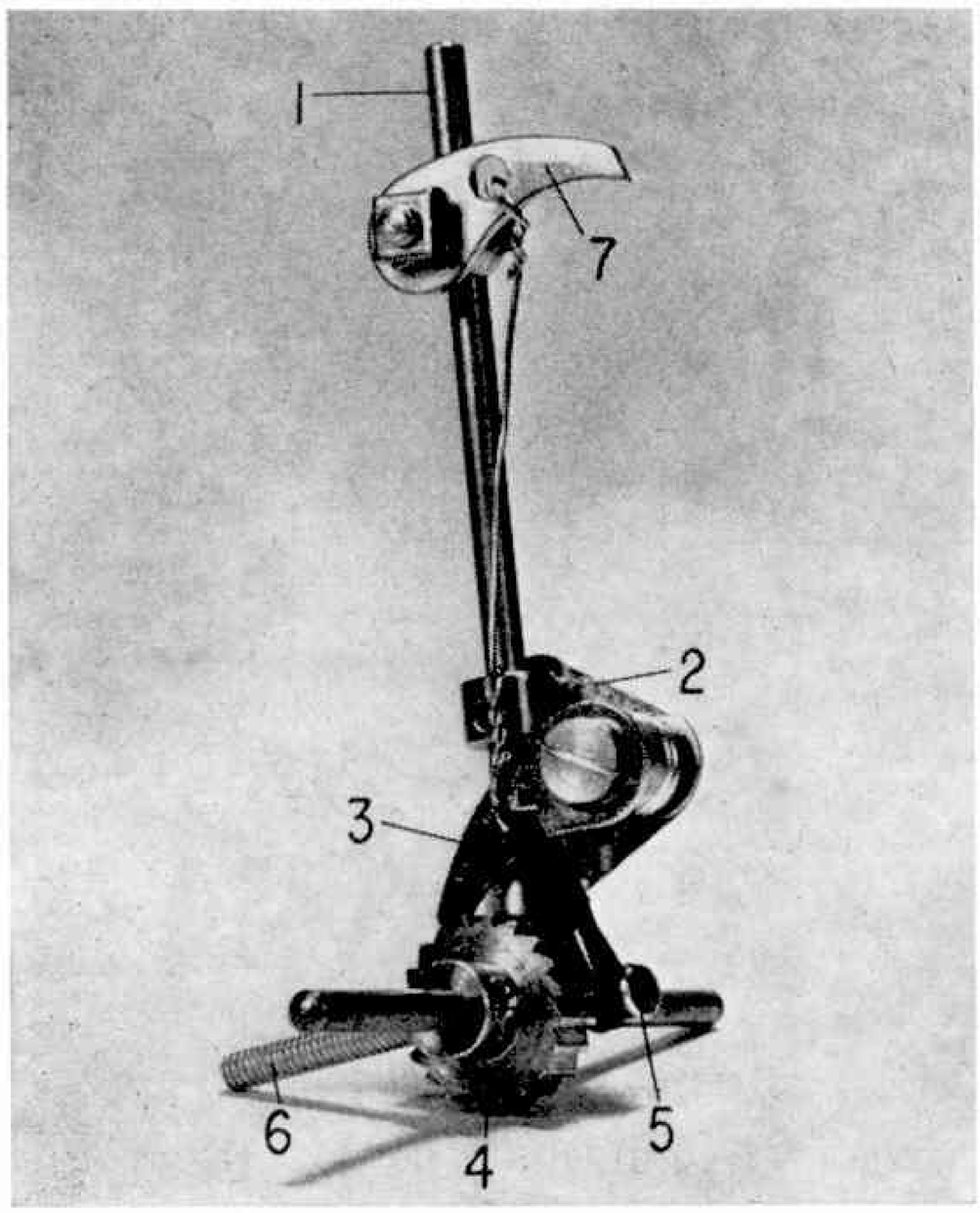
Above, first of the Dinky Kits, the Rolls Royce, showing what a good result can be achieved.

Right, Silhouette of the—er, well, you tell us! This is the subject of this month's Car Outline Competition.





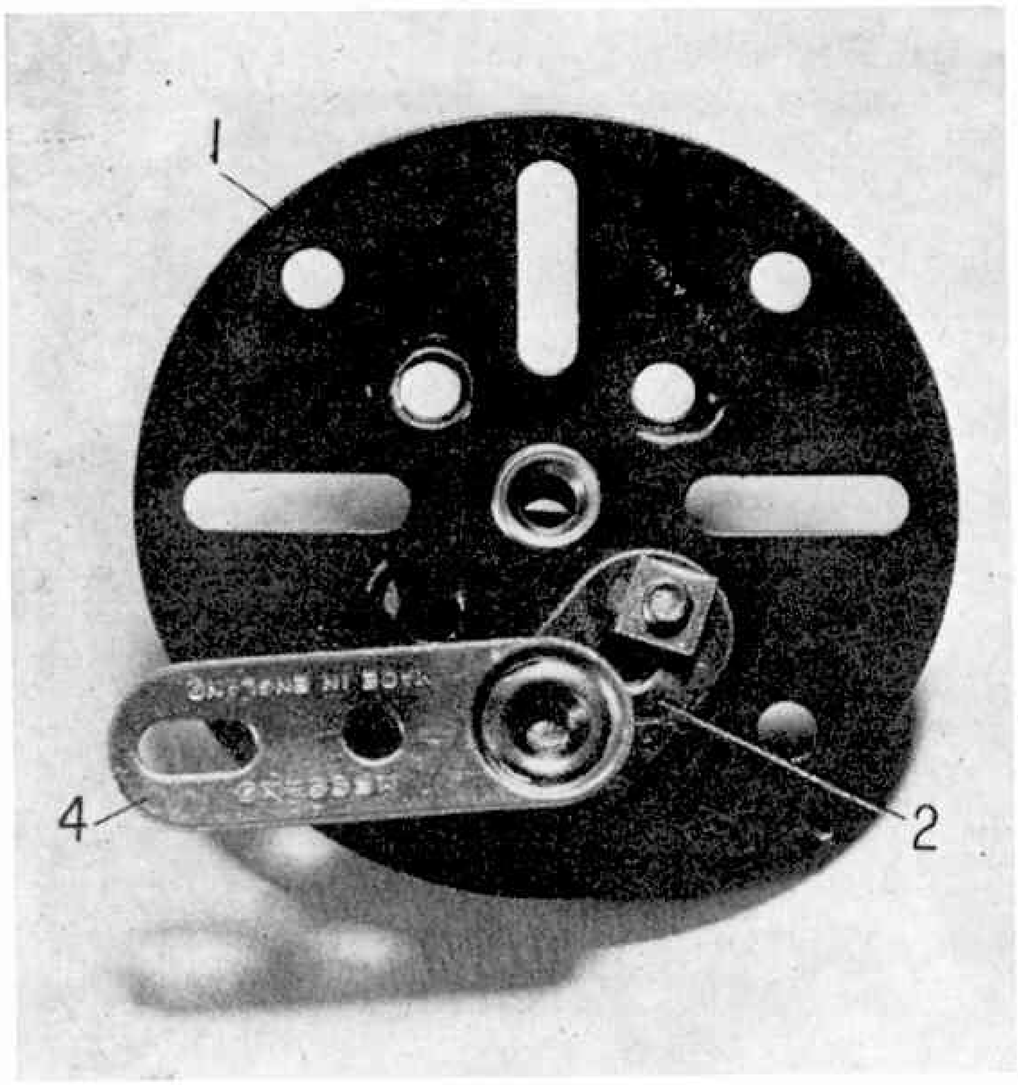
Just to show what can be done with the new Dinky Action Kits and a good selection of Humbrol enamel, these models were built up from Kits and painted by young lady demonstrators at two recent Trade Exhibitions.



Among the Model-Builders

With 'Spanner'

Three mechanisms for heavy vehicle builders



NO MECCANO MODEL-BUILDER would deny that, irrespective of personal preference, some of the most impressive models ever built in Meccano have been based on heavy road vehicles. The undeniable popularity of road vehicles among advanced builders almost certainly lies in the fact that nearly all their numerous mechanical features can be reproduced in working detail using standard Meccano parts and, let's face it, the typical car or lorry incorporates a wealth of interesting mechanisms for the Meccano modeller to reproduce.

Examples of just about everything found in a motor chassis have, of course, been featured many times in the M.M. over the years, but inventive modellers are always up with something new or improved so that there is no danger of the subject drying up. Our first three offerings this month, for instance, prove that the subject is very much alive, all three being useful chassis mechanisms designed by Mr. William Charleson of Oldham, Lancs., for use in a model Foden 8 × 8 Crane-carrier he has built.

Handbrake Lever

First in line is a Handbrake Lever using the familiar Pawl and Ratchet principle which enables the brakes of a model to be applied and locked on while the model is parked. The shaft of the lever is supplied by a 3 in. Rod 1, on the lower end of which a Handrail Coupling is fixed. Carried immediately above this Handrail Coupling are two Collars, to which a 1 in. Triangular Plate 2 is attached by Bolts screwed into the threaded bores of the Collar. Note that two Washers are carried under the head of each securing Bolt.

Held by two Nuts in the apex hole of the Triangular Plate is a Pivot Bolt on which a Pawl without boss 3, a Collar and two Washers are mounted. The Pawl engages with a Ratchet Wheel 4, carried loose on a 3 in. Rod fixed in the head of the Handrail Coupling, the Pawl being held in engagement by a 2½ in. Driving Band looped over a Bolt 5 screwed into the appropriate threaded bore in the head of the Handrail Coupling. Under operating conditions, the Ratchet Wheel is held stationary by a Screwed Rod 6, screwed into one threaded bore of the Ratchet and secured to the vehicle chassis. The Ratchet release lever is supplied by a second Pawl without boss 7, locknutted on the shank of a Handrail Support fixed by its head near the upper end of the main shaft. Finally, Pawl 6 is connected to Pawl 3 by a length of Bare Copper Wire from the 4EL Set, or, indeed, by any suitable wire.

PARTS REQUIRED

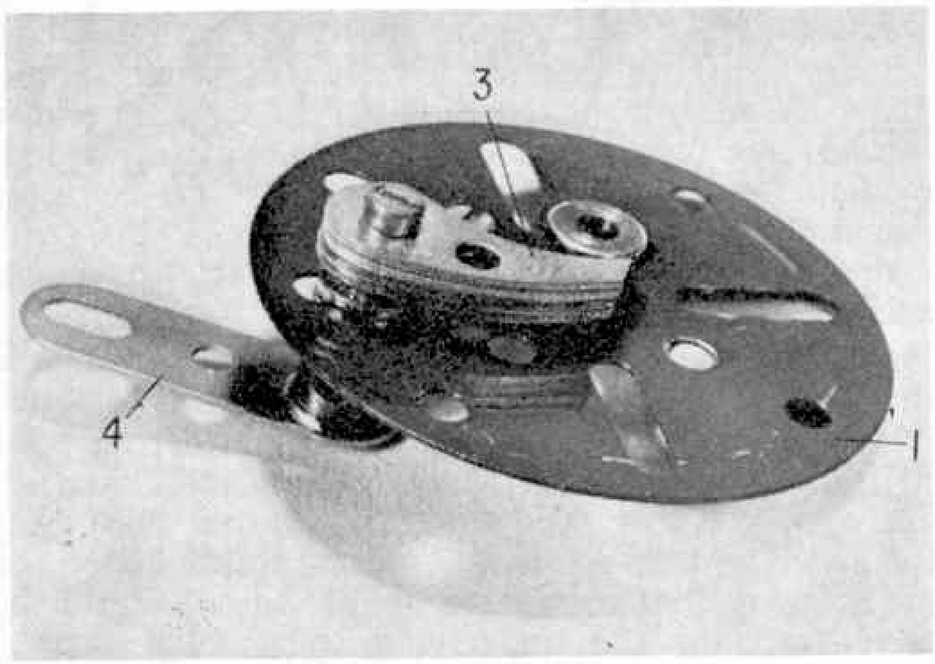
2—16b	1—59	1—136a	1—186
3—37b	1—77	1—147b	1—557
6—38	1—82	2—147c	
	1—136	1—148	

Single-Shoe Brake

Second of Mr. Charleson's mechanisms makes an ideal partner for his Handbrake Lever, being a Single-Shoe Expanding Brake which can be mounted in any suitable motor chassis. The stationary backplate is supplied by a Face Plate 1, to which three Fishplates 2 are bolted, one on top of another, the circular holes

Top: An effective Hand Brake Lever—the first of three Motor Chassis Mechanisms designed by Mr. William Charleson of Oldham, Lancs.

Left: The reverse side of the Single-shoe Brake showing the Threaded Crank to which the control linkage is connected.

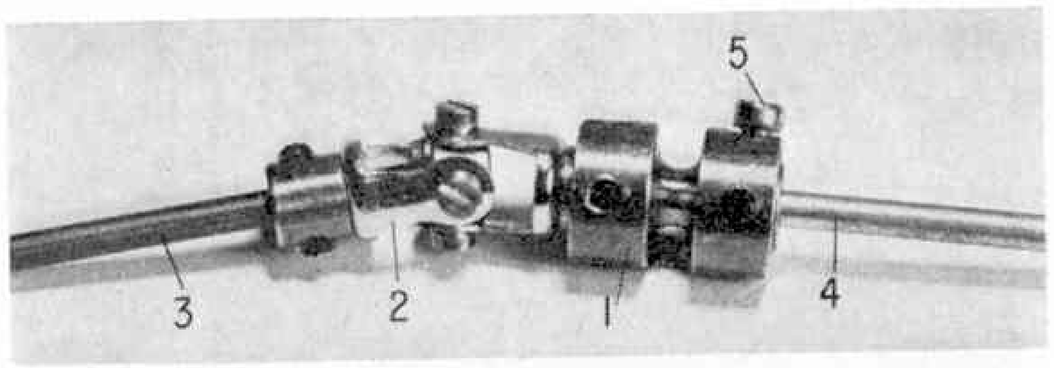


of the Fishplates coinciding with one of the elongated holes in the Face Plate. Four Pawls without boss 3, serving as the actual brake shoe, are tightly fixed onto a ¾ in. Bolt; a Washer is added, then the Bolt is mounted in the circular holes of the Fishplates, being held in place by a Threaded Crank 4, locked onto the Bolt by a Nut. When incorporated in a model, the linkage from the brake lever or pedal would be connected to the arm of this Crank.

Although not shown in the accompanying illustration, the edge of the brake shoe should be faced with two layers of insulating tape to provide an improved friction surface. The shoe can be returned by an external spring on the brake rod, or it can be sprung internally by utilising a short length of Spring Cord attached to the shoe and secured at its other end to a Bolt in the boss of the Face Plate.

Mr. Charleson recommends a Boiler End as the most effective brake drum and this should be mounted, loose, on the central axle, a task best achieved by bolting a Bush Wheel to the inside of the Boiler End, using long Bolts which will then serve as anchoring points for the road wheel.

PARTS REQUIRED		
3—10	1—62a	1—111
3—37b	1—109	4—147c



Left: The Single-shoe Brake designed by Mr. Charleson as seen from the "outside." A suitable Brake Drum can be provided by a Boiler End.
Above: The third of Mr. Charleson's Motor Chassis Mechanisms is this "Splined" Transmission Shaft which allows a good range of movement to the floating rear axle of a heavy motor vehicle model.

Propeller Shaft

In presenting his third and final mechanism, Mr. Charleson explains that, "In the transmission of my prototype I found it necessary to employ a 'splined' transmission shaft to allow the floating rear axles of the Crane a good range of movement." A splined shaft is not, of course, included in the Meccano range and so Mr. Charleson designed his own simple yet perfectly acceptable substitute. It consists basically of a Socket Coupling 1 locked to the boss of a Universal Coupling 2 fixed on the gearbox output shaft 3. Free to slide in the Socket Coupling and in the boss of the Universal Coupling is the propeller shaft 4, the drive being transmitted via a Collar, carrying a Set Screw 5, locked onto the propeller shaft. The Collar is free to slide in the outside end of the Socket Coupling, the Set Screw engaging in the slot of the Coupling. The size of the slot allows the Rod a limited movement while still transmitting drive—simple, but effective!

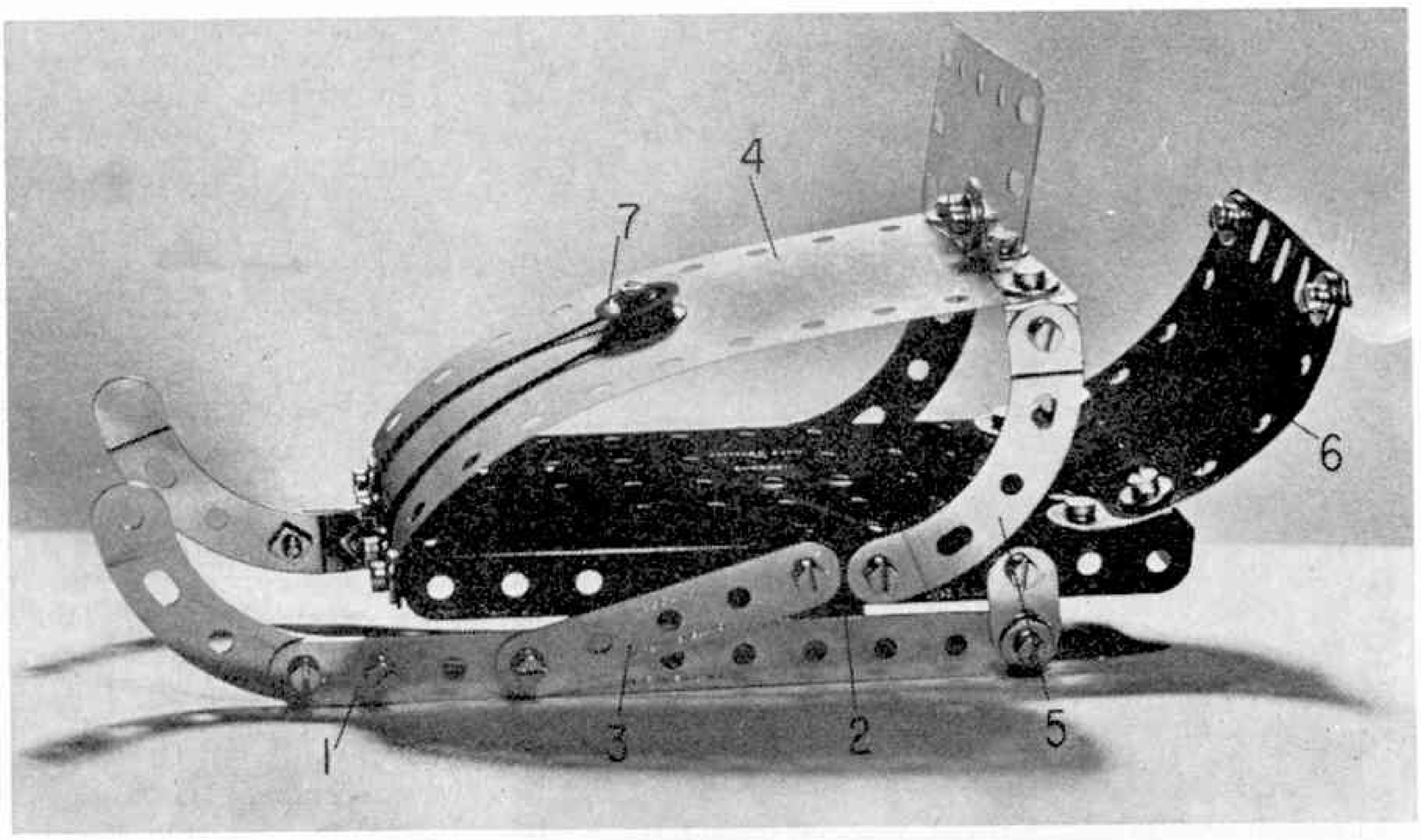
PARTS REQUIRED			
1—59	1—69	1—140	1—171

Canadian Snowmobile

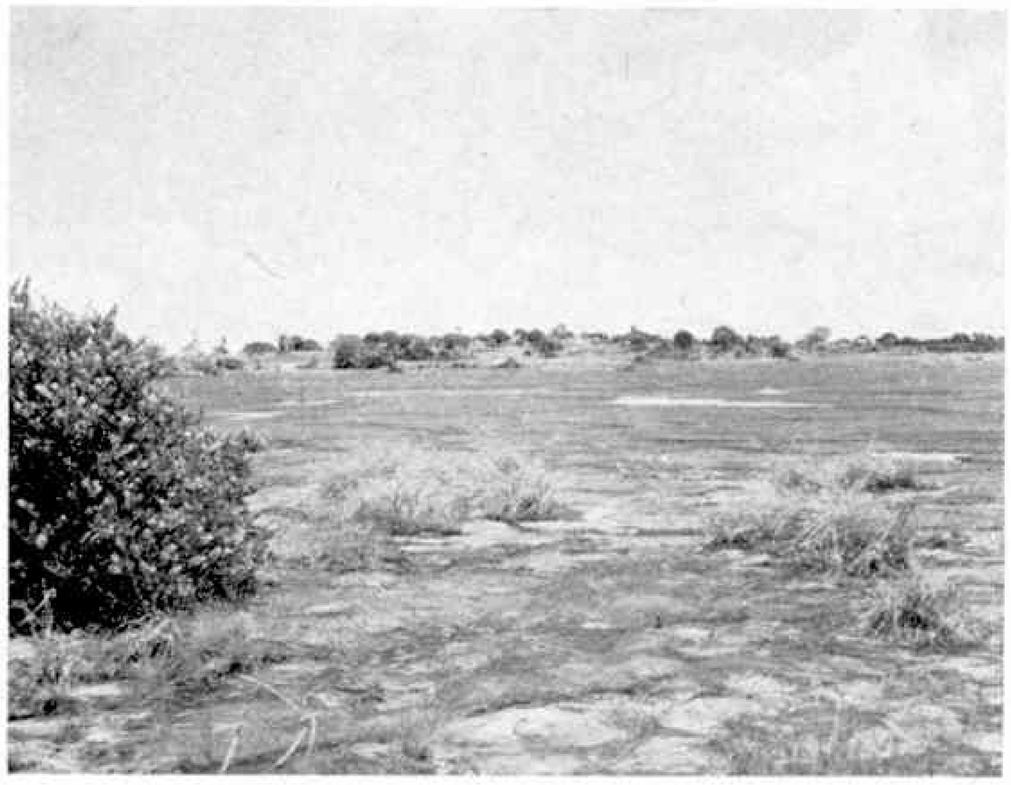
To finish this month, we move away from mechanisms to a complete, albeit small, model—a delightful little Snowmobile designed by seven-year-old David Sharp of Scarborough, Ontario, Canada. Although using only a few simple parts, the model certainly captures the "feel" of the subject and, considering

(Continued on page 245)

SNOWMOBILE PARTS REQUIRED	
2—2	3—12
4—5	1—23
2—10	29—37a
28—37b	4—90a
10—38	1—192
1—52	1—193
	1—194a

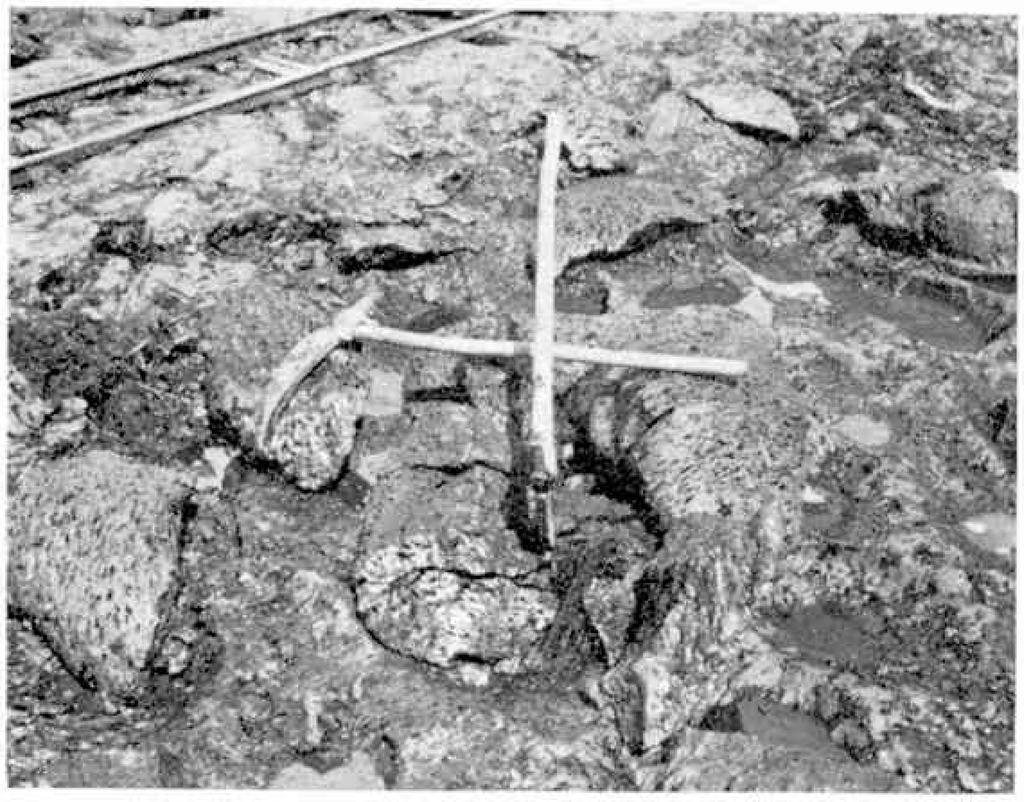


Seven-year-old David Sharp of Scarborough, Ontario, Canada, must be congratulated for this splendid "Snowmobile" which certainly captures the "feel" of the subject.



The Asphalt Lake of Trinidad

A natural phenomenon in the West Indies which affects *your* life. By E. V. Malone



Top photo: A general view of this amazing lake. Above: The surface close up. Below, ditches left after cutting; they fill up in a very short time. *All photos courtesy of Previte & Co. Ltd.*



IN THE SUNNY ISLES OF THE WEST INDIES in the Gulf of Mexico is situated what is undoubtedly the most wonderful lake in the world, because of the fact that it supplies most of the natural asphalt for road-making in the five continents. To be more precise, the so-called "Pitch Lake" at La Brea lies near the south-west coast of Trinidad, the most southerly of this insular group.

It is uncertain how this remarkable lake originated but the general belief is that in some former geological age, perhaps the tertiary, the rocks of the district were folded into a dome by earth movements and that subsequently a considerable amount of the sand was washed away by heavy rains. The remaining beds then became so weak that they were unable to withstand the explosive force of the underlying gas, which experts associated with water and oil.

As a result, the clays and sands forming the cap rock were broken up with explosive violence and the presence of much water led to the formation of a mud volcano. Subsequently large quantities of asphaltic oil seeped into the mud volcano and with the help of fresh gas under pressure, probably kept churning up and down with the mud until the oil was changed into asphalt.

Through time a large basin began to form around the centre of the disturbance and the mixture no longer flowed into the sea. Then it became less and less turbulent, the asphalt hardened on exposure to air and there was left a thoroughly mixed substance consisting of asphaltic bitumen and finely disseminated mineral matter.

Roughly circular in shape today, the lake covers an area of about 110 acres. Although hardly noticed by the human eye, its contents are constantly in motion. This is supported by the fact that the rail-tracks laid across its surface have to be adjusted regularly. Besides, fossils of extinct creatures rise to the surface, not to mention the huge tree-trunk believed to be five thousand years old which appeared a few years ago before disappearing as mysteriously as it had come.

Its surface, which is solid enough to be walked on, is broken into a series of large folds caused by movement from the centre outwards. In the troughs thus formed collects rainwater from which bubbles of natural gas may be seen rising from time to time. Scattered over the surface are scrub-covered islets of sandy rock which move hither and thither depending on the movement of the lake itself. Shining as it does beneath the glare of the tropical sun and accompanied by the persistent reek of gas, the whole scene contrasts with the beauty and magnificence of the rest of the island.

Although Christopher Columbus discovered Trinidad in 1498 and it was colonised by Spain in the next century, there seems to be no record of the existence of this unusual lake until the entry Sir Walter Raleigh made in his diary in 1595, thus: "There is that abundance of stone pitch that all the chippes in the world may be therewith laden from thence and will make triall of it in trimming our shippes to be most excellent good and melteth not in summer as Pitche of Norway and therefore for shippes trading

South partes very profitable." Moreover, despite the fact that Britain annexed the island near the close of the eighteenth century, it was not until 1888, in fact (the year in which there was a tremendous increase in numbers of mechanically-propelled vehicles) that an English company obtained a concession from the Crown to exploit the phenomenonal deposit, a lease which is renewed at intervals, the last being in 1956 for a period of thirty years.

In this connection the names of two men, Dr. Nicholas Nugent and Admiral Thomas Cochrane, 10th Earl of Dundonald, stand out, as they convinced the Government of the time of its commercial possibilities; so it is to this pioneering partnership that the motoring public ever since have owed a big debt of gratitude for the dust-free roads which we all take more or less for granted today.

Thanks to them and their successors, the lake is now a busy industrial centre employing over 1,500 workers and exporting no less than 60,000 tons of refined asphalt every year to all quarters of the globe. Excavating it is much simpler than appears at first sight. Since on the surface it is quite brittle, originally a blow of the mattock broke it easily into large lumps as much as 70 lb. in weight. These manual methods of cutting and loading have been superseded by modern machines for each process, after which one-ton trucks drawn by cable convey the crude material along light railways running on massive palm-log sleepers to a large refinery near by. The holes caused by the removal of asphalt, incidentally, disappear inside a few hours due to the upward movement of the substance.

At the refinery, the asphalt is tipped into one of a series of open-top receptacles with a capacity of 100 tons each, wherein it regains its fluid state, and the dissolved water driven off. Then it is screened to remove stones and other debris, before it passes to a clever barrel-filling device around which containers, surface-cooled by water, are arranged in circles for continuous pouring. It may be of interest to add that the containers are no less than the metal drums known as "bongo drums" which have been made famous by the dark-skinned calypso music-makers.

Not surprisingly, processing at the factory goes on round the clock. From here the drums containing the refined product, known as "epuré", are taken to the pier at the shore by means of a modern overhead conveyor, past coconut-palms with swaying branches *en route*, to ships of up to 30-foot draught, waiting patiently as they are, to carry the precious cargo in their holds across stormlashed seas to roadmakers everywhere.

Asphalt as such is not used for its many purposes in its pure state but is mixed with liquid petroleum residues in different proportions to create bituminous fillers, known to the trade as asphaltic cements. Although these can be used as they are, they are in turn frequently mixed with mineral fillers. Surfacing roads, of course, is the principal use, as experience has proved it to make an ideal running surface, not only non-skid but durable and resilient but, in addition, waterproof and dustless. It also fills the rôle of expansion between sections of concrete roads, besides being used in pavements and as a cementing agent and filler for other types of paving.

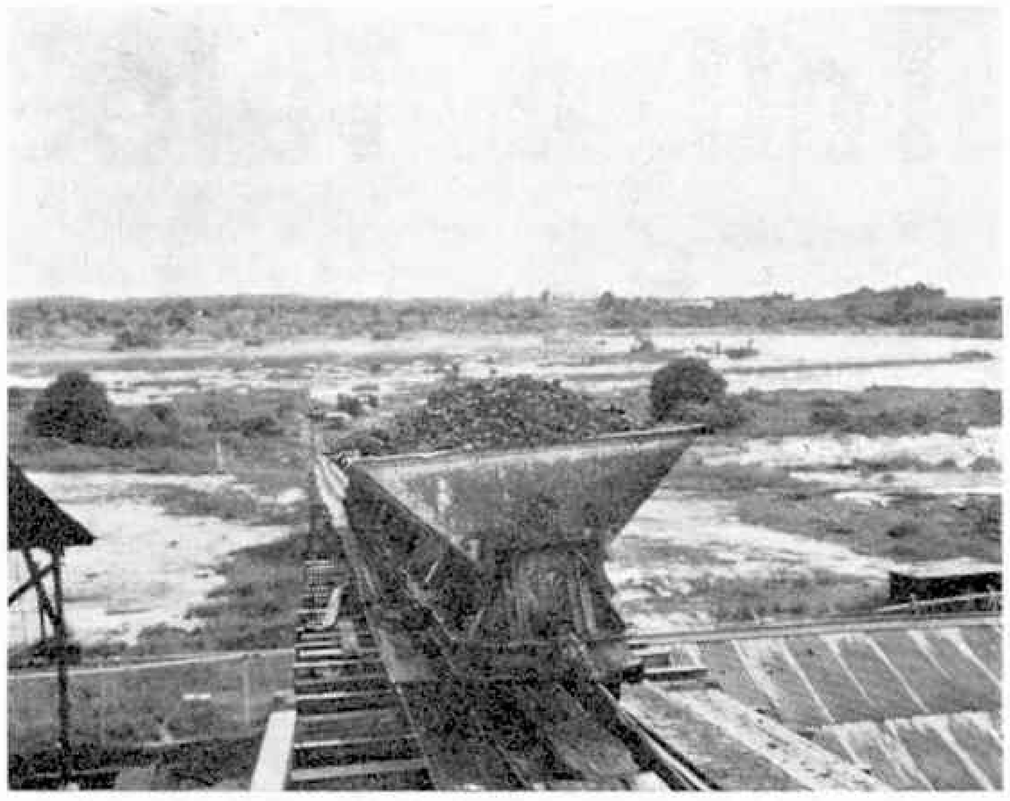
How long will the asphalt lake of Trinidad continue to supply our needs is an obvious question? No definite answer, unhappily, can be given in view of the fact that a hundred years have lowered the level of the surface only by a few feet. Its capacity doubtless depends on its depth and this has prompted investi-



gators to make borings for the purpose. The first trials ended in failure when the casing or pipe used was carried far off vertical at a depth of 150 feet or so by the lateral pressure of the asphalt.

But in 1925 a new method in which a derrick of

(*Continued on page* 230)





Top: A mechanical ditcher digging the asphalt and loading it into a dumper truck. Above: A train of tipper trucks ascending the ramp into the refinery. Below: A cable railway takes filled drums to the pierhead.

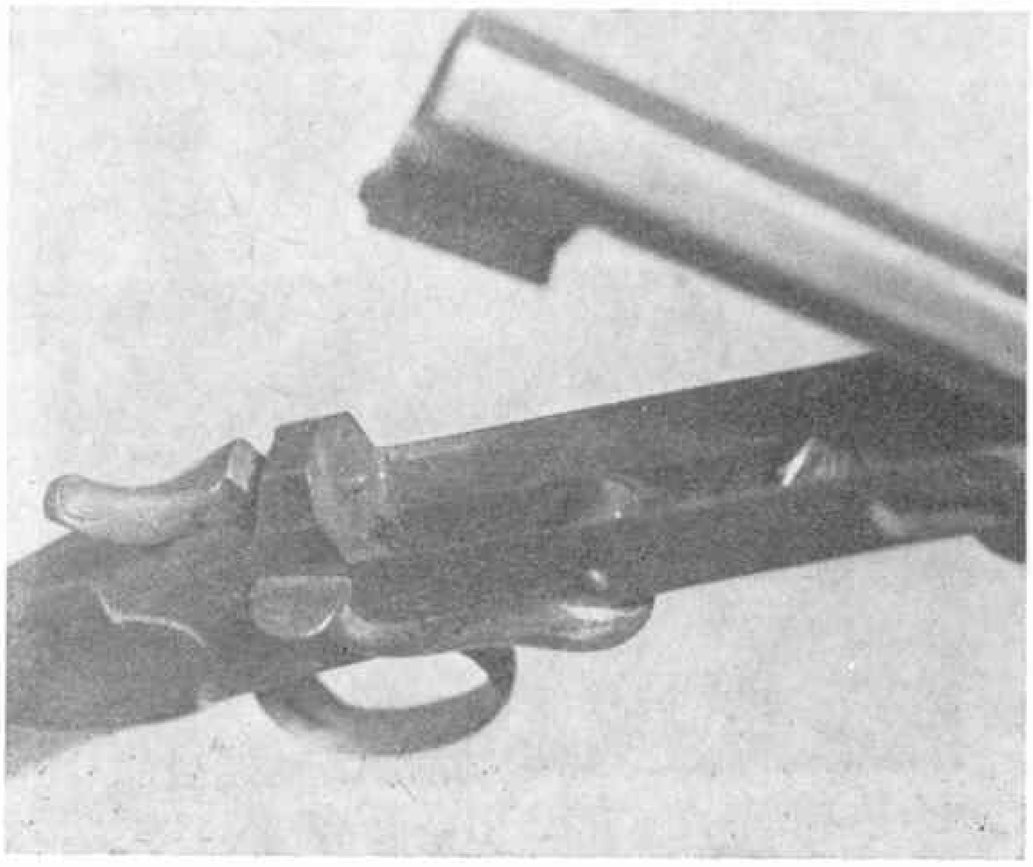


Even Bullets Tell a Tale

Peter Wilkes describes what bullets and cartridge cases can reveal to a ballistics expert

Above: In the sporting field accidents are possible. It is then that the expert can help the police and decide if it was an accident and, if so, the gun and person responsible. From the spread of shot from a shot gun, direction of fire, etc., can be given, and also the distance from the object.

Below: The wear inside the breech of this shot gun can be clearly seen. It is obvious that, over the years, each gun wears differently.



THE CIRCUMSTANCES GAVE every indication of suicide. The gun bore the fingerprints of the dead man. There were powder burns on the body indicating that the weapon had been held only a few inches away from the deceased when the trigger was pulled and, when the bullet was recovered by the pathologist, it was found to be of identical calibre to the gun found at the scene. Before closing their files on the case, the police submitted gun and bullet to the Forensic Science laboratory for routine examination by a ballistics expert.

His report shocked them out of their complacency. The calibres were indeed identical and furthermore the bullet had been fired by a gun of identical make but NOT the one submitted for examination. Once again expert evidence had destroyed a criminal's carefully prepared plan and started detectives, in a case where they themselves would have agreed with the first findings, on a hunt for a cold blooded killer.

The story of ballistics is, by the nature of the subject under examination, intimately connected with violence and sudden death, but no case could have been more bizarre than that which first brought it to the eyes of the public.

The murder of Police Constable Gutheridge, in a remote country lane in Essex in the year 1927, by car thieves, horrified the public on two counts. Killings by firearms always brought a fear of the approach of a gangster era, but this particular murder indicated to what extent violence could be harnessed by men who found themselves on the outside of normal society.

At a time when people of lower intelligence believed the widespread superstition that the eyes of a dead person always held the last scene that comes before them, and that science could 'lift' that scene, the killers shot out both the eyes of the dead policeman.

As can be imagined, the crime made headlines in newspapers throughout the country and was still vividly in the minds of most people when Frederick Guy Browne and William Kennedy stood charged before a jury. The public were even more enthralled when they learned that evidence was going to be produced by the prosecution to prove that firearms are as individual as people and that the marks left on bullets and shells could be as positive an identification as fingerprints.

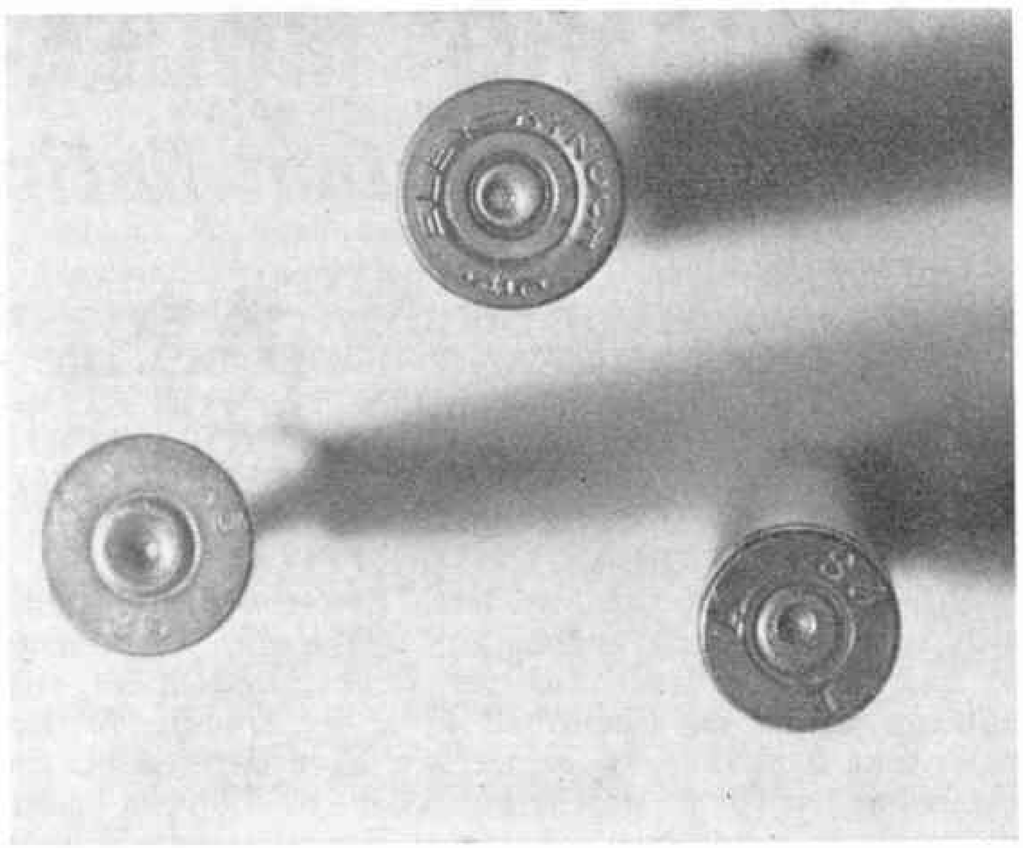
The man called by the police to give this evidence was Robert Churchill, a London gunsmith who had not only been engaged with firearms all his life, but who had studied ballistics as a science and had appeared in previous cases of a minor nature that had not gathered the widespread publicity that surrounded the murder of P.c. Gutheridge. Of great importance to the prosecution, Churchill was then the only man in England who had a suitable comparison microscope.

This was particularly important because only by using what is in effect a twin microscope, enabling two specimens to be examined at the same time, can the necessary results be obtained and photographs produced to prove to a judge and jury the absolute certainty with which bullets are identified.

The trial, from the scientific point of view, was a complete success. The court accepted the ballistic evidence and both accused were convicted and hanged.

From that time on ballistics became established as a separate science within the framework of forensic aid in criminal cases and with Robert Churchill as its foremost authority.

What the expert was able to prove to the court in the Gutheridge murder trial, and what ballistics experts continue today to show, is the pattern made on both



Even to the inexperienced, the marks on these three used cartridges and bullets were obviously made by different guns. To the specialist the marks tell even more and, from such a shell, he can identify the individual gun responsible.

bullets and their cases by a particular firearm.

The identification of bullets depends on the individual marks made on them as they pass through the barrel of the gun. All small arms have rifled bores, bores that have been fitted with grooves, whose purpose is to spin the bullet as it passes through the barrel, and hence impart greater accuracy by stopping it from swerving in flight.

These grooves vary between manufacturers, in regard to their number, width, depth, direction and pitch, and also vary as from one example of a particular firearm to another. Individual variations between one model of a gun and another are caused by different minute scratches left in the rifling by the tool used. Because of slight wear in the tool or different pressures applied to the different guns, the scratches in the surface of the bore of the gun all contain slight variations, and it is when these are transferred onto a bullet that is fired from the gun that the " fingerprints " of that gun are left.

To compare two bullets, the expert first obtains a comparison by firing a round of ammunition under test conditions. Today a catchmen box is used. This is a box, of at least six feet in length, packed with cotton wool, and with pieces of card fitted every twelve inches. After the shot has been fired, the card dividers are each withdrawn until the section in which the bullet has finished is reached. It is then a simple matter to withdraw the cotton wool from that section and retrieve the bullet.

Both the test bullet and the suspect one are placed in the comparison microscope and rotated until it can be seen that the marks left on each bullet by the rifling of the gun are identical. Photographs are taken through the microscope to enable the evidence to be presented to the court in such a manner that the most untechnical minded jury will have no difficulty in seeing the similarities which prove the prosecution's assertions.

It often happens that, when the police arrive at the scene of a shooting, they find not the bullet but a shell case. The same principles of comparison apply to those for, although they obviously do not contain rifling marks, the pressures exerted on the case by the explosive contained in it, at the time of the firing, cause the case to swell in such a manner that its outside takes a cast of the breech of the gun, and of marks that are as individual as those in the rifling of the barrel.

It is not only in giving opinions as to whether a particular bullet or shell case has come from one particular gun that the ballistic expert can help the police. He can, with great accuracy, inform them of the type of weapon that fired a bullet, even before the gun has been found.

For this information the ballistics scientist relies on the varying designs of weapons.

Churchill, in one murder case, when all the police could present him with was a bullet found at the scene of a murder, identified it as from a .25 automatic. From details he had collected of individual makes of gun, he was able to say that, out of 119 types tested, only six were rifled with left-hand grooves such as this bullet had and, as the width, depth and pitch of each of these varied, he was able to name the make of gun with certainty.

The work of the ballistics expert is today made easier in this aspect through the efforts of two German scientists, Hees and Haslacher. They are responsible for a monumental work called the " Atlas of Firearms ". In card index form and consisting of details of every known type of firearm, giving the rifling, pitch, width and depth it enables identifications to be made from bullets found at the scene of a crime.

Sometimes a criminal believes himself safe after destroying the weapon used in the commission of murder, but even then the ballistics expert can prove to be his undoing.

When Elizabeth McLindon, housekeeper at the London residence of the King of Greece, was found murdered, suspicion fell on her fiancé, Arthur Boyce. Police enquiries nearly came to a halt when they found that Boyce was living in Brighton and they could not prove that he had been in London on the date of the murder. However, in talking to people with whom Boyce had been acquainted, they found one who had sold him a gun of the calibre used in the killing. Although this was circumstantial evidence that Boyce could easily have explained away, the seller happened to find, in the pocket of an old suit, a cartridge case that had come from the gun. When this was handed to Robert Churchill, with the one found at the scene of the killing, he was able to say, after examination of the marks of the gun's breech on both of them, through a comparison microscope, that without any doubt, both were from the same gun. His evidence had the certainty of a fingerprint specialist and the jury had no hesitation in bringing a verdict of guilty against Boyce who was another to be hanged through the power of the microscope.

SHOWING HOW FIREARMS EVIDENCE IS COLLECTED

Police search for:	Expert can tell:
1. Firearms left at the scene. 2. Cartridge cases left at scene. 3. Fired bullets.	Type of firearm used and also rebut defence of accidental discharge.
4. Wads from shotguns. 5. Pellets.	Distance of victim from attacker.
6. Bullet marks.	Direction of shot.
7. Burning on victim and on clothing.	Rebut or prove suicide from nearness of weapon on discharge from powder burns.
8. Burning on suspect or his clothing.	

MECCANO MODEL-BUILDING CONTEST

Important Notice for Competitors

BECAUSE OF THE BRITISH POSTAL STRIKE, WE HAVE DECIDED TO EXTEND THE CURRENT MECCANO MODEL-BUILDING COMPETITION BY ONE MONTH. THE CLOSING DATES, THEREFORE, ARE NOW APRIL 30th FOR COMPETITORS IN THE U.K. AND IRELAND AND ONE MONTH LATER, MAY 31st, FOR OVERSEAS COMPETITORS.

When you read this, we trust that the postal strike will have been long ended, but at the time of writing it has been in force for six weeks, and there still appears to be no likelihood of a settlement. Rather than take a chance, therefore, we have decided on the extension, with a particular view to helping competitors in countries outside Europe—notably in Australia, New Zealand and Africa—who need up to six weeks for their Post to reach Britain.

With the extra time now available, any readers who have not yet entered the contest can still do so, but remember that, this year, the contest rules are different from those applying in past competitions: IT MUST BE POSSIBLE TO BUILD ALL MODELS WITH THE CONTENTS OF A CURRENT MECCANO SET BETWEEN 1 AND 7. PRIZES GALORE !

As usual, entrants will be split into two Sections, A and B, Section A being for entrants under 14 years of age on the competition closing date and Section B for entrants aged 14 or over on that date. Each Section will, in turn, be split into ten sub-sections numbered from 1 to 10, the sub-section number depending on the Standard Meccano Set with which the submitted model is built. Three prizes will be awarded in each sub-section, with sub-sections 3, 4 and 5 being given priority and receiving the higher prizes. First prize in each sub-section will be in cash, second prize will be a Meccano Set and third prize will be a selection of Meccano Parts, the Parts to be chosen by the winner himself.

In section A, the first prize in sub-sections 3, 4 and 5 is £5 cash, the second prize being a No. 4 or equivalent-value Meccano Set and the third prize £1.50 worth of Meccano Parts. Winners in sub-sections 1, 2, 6 and 7 will receive £4 in cash, the second prize being a No. 3 or equivalent-value Meccano Set and the third prize being £1 worth of Meccano Parts.

In Section B, the first prize in sub-sections 3, 4 and 5 is £7 in cash, with a No. 5 or equivalent-value Meccano Set as second prize and £2 worth of Meccano Parts as third prize. Winners in sub-sections 1, 2, 6 and 7 will receive £6 in cash, the second prize being a 3M or equivalent-value Meccano Set and the third prize being £1.50 worth of Meccano Parts.

HOW TO ENTER

Any number of entries can be submitted for the competition, provided each model can be built with the contents of a current standard Meccano Set between 1 and 7, and different entries can fall into different sub-sections. Any kind of model is eligible for entry, unless taken direct from a Meccano Manual, and all will be judged on their individual merits. The models, however, must be your own unaided work.

Once you have built your model, obtain a good photograph of it, or, failing this, a reasonably detailed sketch. It is also advisable to include a short description of the main features of the model with your entry, mentioning any points of interest you would like brought to the attention of the judges, but the actual model itself must not be sent. A list of Sales Numbers and quantities of the Meccano Parts used in the model will also be required.

In entering the Contest, write your name and address on the back of each photograph or drawing, together with the letter A or B, depending on the age Section in which you qualify, followed by the number 1 to 7, according to the Meccano Set with which the model can be built, and forward to: Model-Building Contest, Meccano Magazine, Binns Road, Liverpool L13 1DA. Remember, the competition now closes on April 30th for competitors in the U.K. and Ireland and one month later, on May 31st, for overseas competitors.

Prize-winning entries become the property of Meccano Tri-ang Ltd., but unsuccessful entries will be returned if accompanied by a suitable stamped-addressed envelope or, in the case of overseas entries, a self-addressed envelope and the appropriate International Reply Coupons. Entries can be accepted only on the understanding that Meccano Magazine will not be held responsible for any entry damaged or lost and that the judges' decisions are final. No correspondence relating to unsuccessful entries can be considered.

SET CONTENTS LISTS

To aid prospective entrants who are unsure of the contents of the various current Meccano Sets, we will be pleased to supply a Set Contents List upon request. Simply send a stamped-addressed envelope or appropriate International Reply Coupons to: Meccano Magazine, Northern Office, Dept. SCL, Binns Road, Liverpool L13 1DA.

SPECIAL BONUS

As a special bonus we are prepared to feature suitable interesting model entries in Meccano Magazine in due course, provided that sufficient details of the models can be supplied by the builders to enable full constructional articles to be prepared. The necessary information would not be required until after the competition has closed, therefore, if you are interested in seeing your model featured in full, it is advisable to either keep the original model built up, or to at least keep sufficient constructional notes to enable the model to be re-built at a later date.

Models chosen for inclusion in the Magazine will not necessarily be drawn from prize-winners only. Usable unsuccessful entries will also be considered and the builders of all models used, whether prize-winners or not, will receive a publication fee, calculated at our standard rates. The builders of models in which we are interested will be contacted shortly after the competition closes and, if they subsequently wish to have their models featured and are able to supply the original model, or sufficient re-building information, we will be delighted to hear from them. Final decisions on publication, however, cannot be taken until we have been able to see or rebuild the models. We will ourselves prepare the final features.



BUILD YOURSELF A DINKY TOY

A NEW PRODUCT FROM MECCANO

By FRANK LOMAX

MECCANO-TRIANG LTD., the makers of Dinky Toys, have entered the construction kit field with a unique product which could well shake the established foundations of the market, at present dominated by plastic models.

Meccano, who are continually increasing their extensive Dinky range, have an undisputed world-wide reputation for quality and accuracy. Introducing a completely new product can be a make-or-break business, especialy in today's competitive toy market.

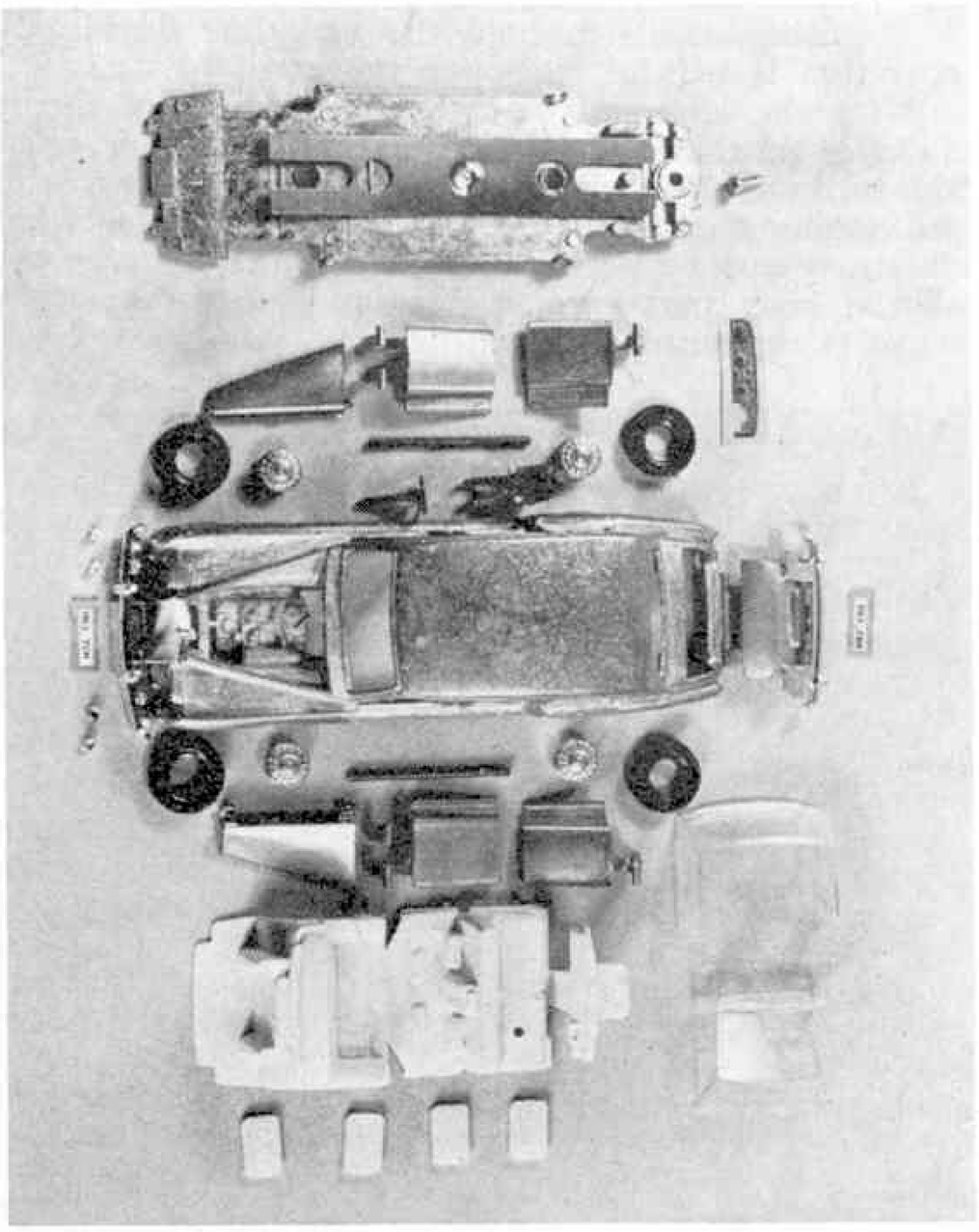
Fully aware of these dangers, Meccano-Triang have emerged with a new concept of the Dinky Toy: Dinky Toys which you can build yourself, without relinquishing the strength or the play value of the real thing.

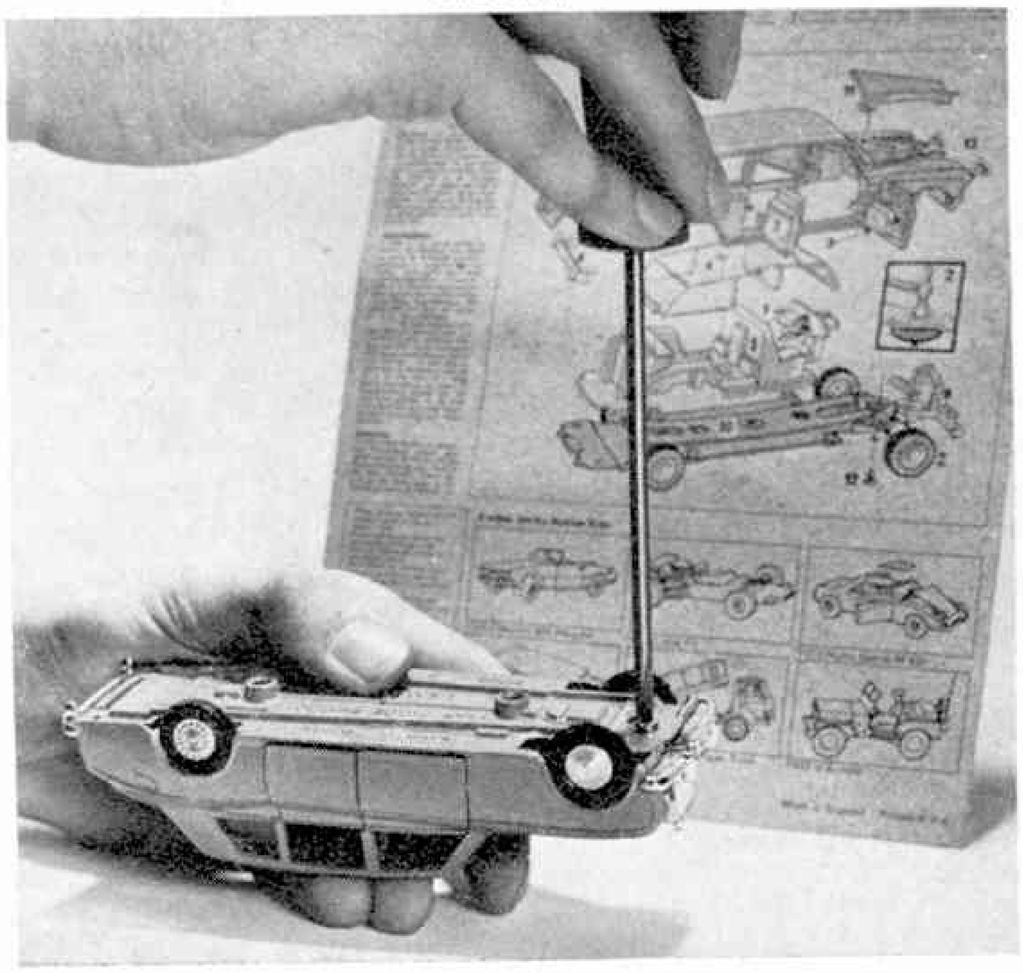
The obvious difference between these "Do-it-Yourself Dinky Toys" and their plastic counterparts is that the components are all metal, in a knock-down form, produced to the usual high standards. The only non-metal parts, in fact, are the moulded plastic interiors, tyres and jewelled headlamp lenses contained in each kit.

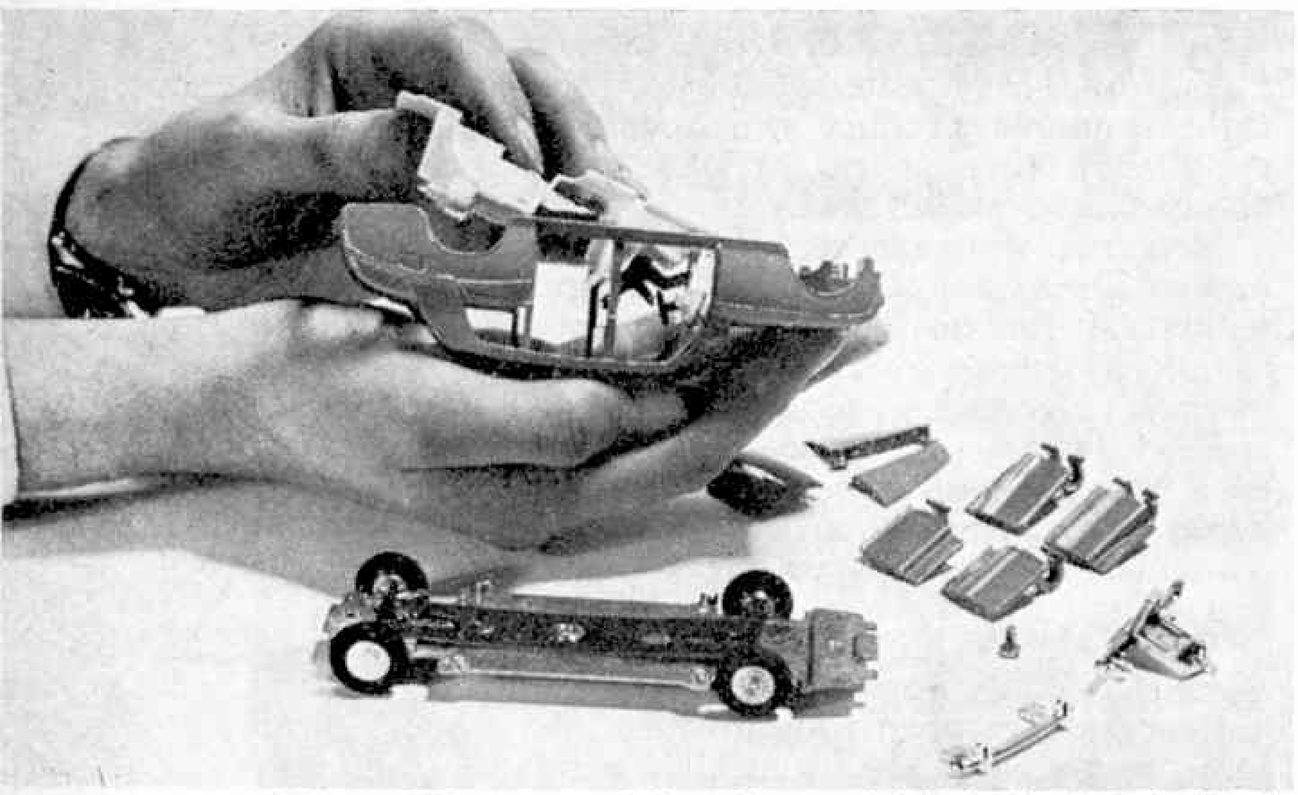
Identified under the name of "Dinky Action Kits", they have distinct advantages over their plastic relatives, advantages which could well capture the loyalty, not only of the Kit-man, but also, because of their inherent simplicity, of the young collector who finds plastic kits beyond his capabilities.

The principal point, I feel, is that all the models can be put together, painted and then taken apart as often as you like, without the need of adhesive. Also, unlike the majority of plastic kits, a sample phial of Humbrol enamel, sufficient to paint the model, is supplied with each kit, the parts being pre-bonderised in preparation for painting.

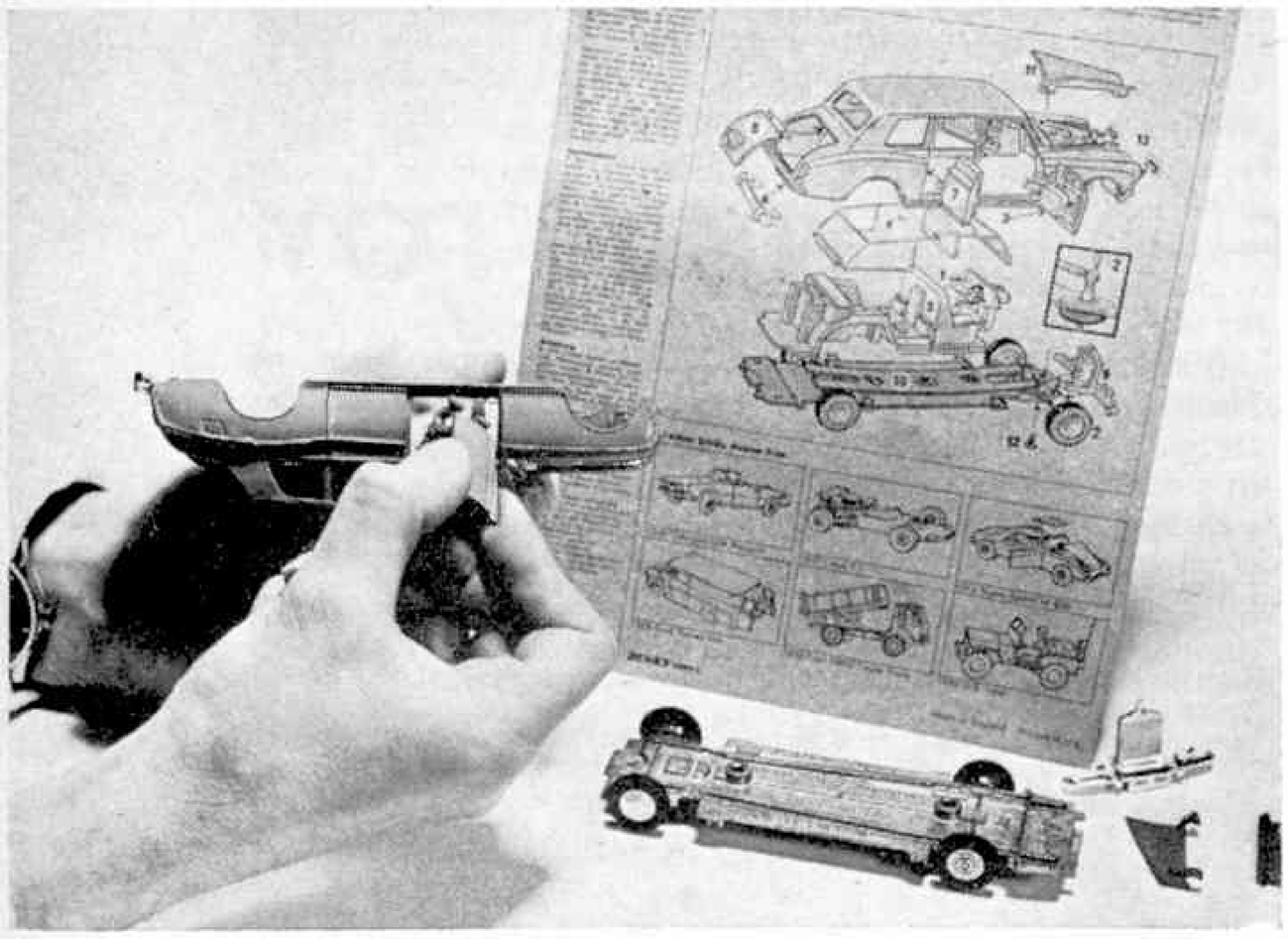
Top: The first "Do-it-Yourself" Dinky Toy from the range of Dinky Action Kits, number 1001 Rolls-Royce Phantom V Limousine. Left: This picture of the parts included in the Rolls-Royce Action Kit clearly shows how many individual components are contained in a typical Dinky Toy. Below: With all the doors and internal components in position, the base-plate assembly is added and screwed into place using the special self-tapping screw provided. Earlier steps are shown overleaf.

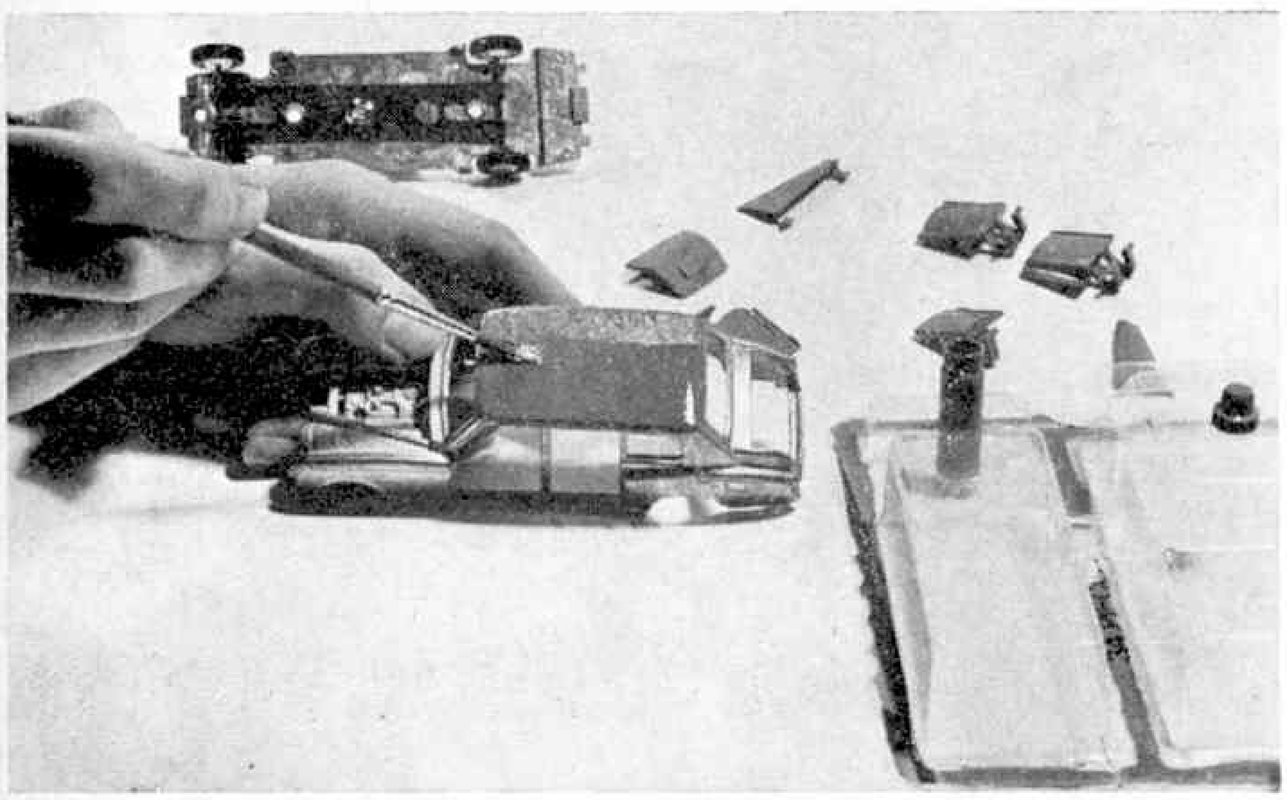






Above: When assembling the model it is best to hold the body casting upside-down to prevent the seat moulding from becoming dislodged. Below: Keeping a watchful eye on the easy-to-follow assembly instructions printed on the back of the pack, the doors are fitted to our test model, still keeping the body casting in an inverted position. Bottom: Packed with each of the new Dinky Action Kits is a sample phial of Humbrol enamel, sufficient to paint the model. The components should be painted while unassembled. A special stand to hold the phial of enamel during painting is included in each Action Kit's "blister" Pack.





There is no need, of course, to use only the sample colour provided. Humbrol market a wide range of colours and it is possible to create your own individual version of a model at very little extra cost, an attribute which should appeal to artistic readers. The picture on page 217, showing a variety of hand-painted models, will give you some idea of just what can be done.

Selected Range

Initially, the range will include seven models, which are duplicates in every way of original Dinky Toys, with opening doors, boots, bonnets, etc. The first three kits, the Rolls-Royce Phantom V Limousine, the Lotus F1 Racing Car and the Ford Transit Van, are already in the shops. Four more kits are on the way—a U.S. Jeep, Matra M530 Sports Car, Peugeot 504 Cabriolet and a Ford T.K. Tipper Truck—and additional items are planned for the future.

Simple Instructions

Naturally, full assembly instructions are included with each Kit and this, again, is where the Dinky Kits differ from many of their plastic counterparts. How often have comparatively complicated instructions made plastic kit assembly an arduous task? Pretty frequently, in my experience, but this can certainly not be said of the new Dinky Kits. Indeed, the assembly instructions and "exploded" diagrams on the back of the transparent "blister" packs are simple enough for even a small child to follow without difficulty.

Assembly Hints

From my tests, I found that it was advisable, when assembling the base unit of a model, to first fix one of the wheels on each axle, using a lightweight hammer, before mounting the axle in the baseplate. Once this has been done, the axle should be inserted in its channel and the second wheel secured with the base unit standing on its edge to achieve a satisfactory fit. A "second man" to hold the baseplate during this operation is helpful, although not essential.

With the base unit completed, assembly of the remainder of the model is relatively easy. It is advisable to hold the main body casting upside-down while positioning the doors, boot, bonnet, etc., after which the base can be secured in place, making sure that all the body parts are in position before the locking screw is tightened.

Painting

Before painting, the kit should be assembled to check that all the parts fit together neatly, the removal of any unwanted metal, or "flash", on the parts being attended to at this stage, as necessary. Once everything is in order, the model should be taken apart and the individual components painted, the phial of enamel being stood in the special holder provided for it in the plastic "blister" in which the parts are packed. I found it useful to make arrangements for holding the painted components and, as wet paint collects dust, they should be covered during drying. I painted one side of each part first, allowing it to dry, before starting on the other side. For an immaculate finish, the paint should be used liberally, flowing it on with the brush, not "stroking" excessively backwards and forwards, which leaves brush marks. When everything is dry, the model can then be finally assembled to result in a real honest-to-goodness Dinky Toy!

More

DINKY TOY NEWS

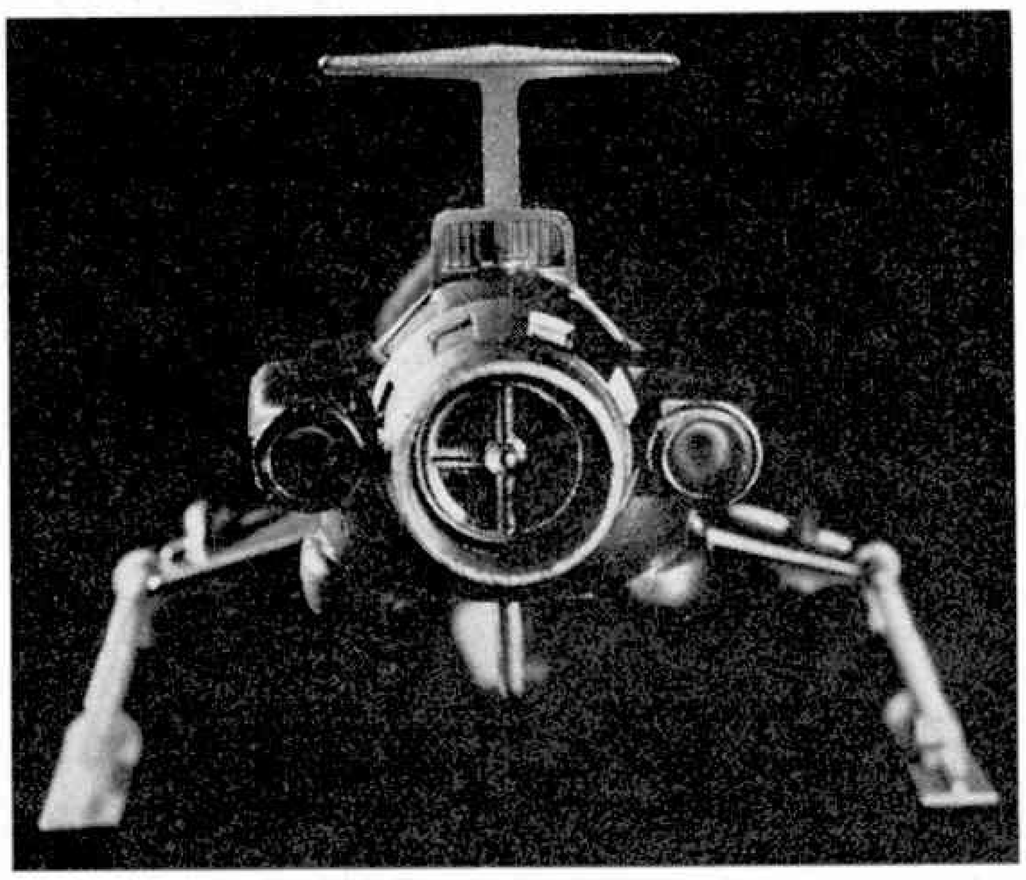
by Frank Lomax

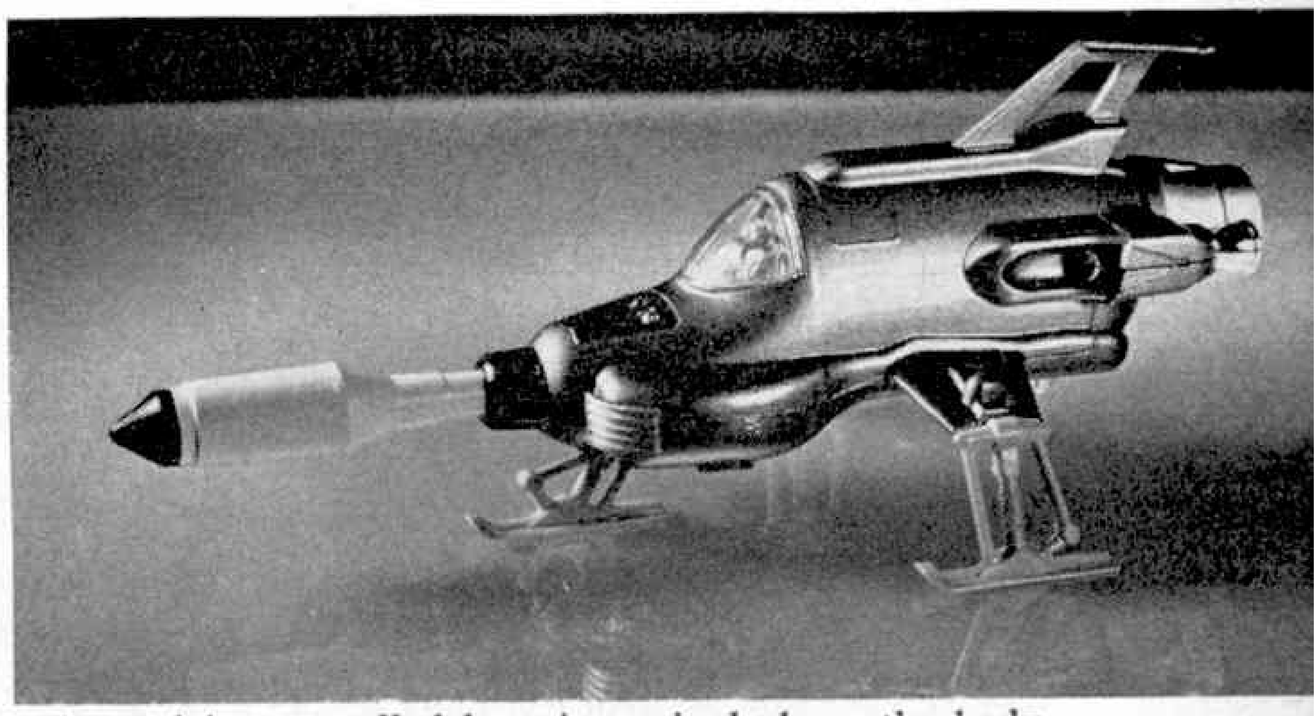
THE SPACE-AGE CULT, born in the science-fiction comics and further popularised by the cinema and especially television, has had a profound influence on the development of children's toys all over the world during the last decade. The trend is still continuing and, with three successful manned moon landings, it is unlikely to lose any of its momentum.

Television has, undoubtedly, brought the wonders of the cosmos into the home and the increasing variety of science-fiction and space-travel programmes which appear on our screens proves the existence of an established interest in the subject. It is from television that Dinky Toys have received inspiration for their very latest space vehicle, the fabulous U.F.O. Interceptor—a fighting missile ship, taken straight from the Independent Television programme, "U.F.O.".

Perhaps one of the most interesting and dynamic models ever to appear in the Dinky Toy range, the U.F.O. has an "explosive" feature which will provide hours of fun: a large rocket, fired by a spring-loaded plunger, can be launched from its nose, accompanied by a spurt of flame and an impressive "bang", the latter effects supplied by a cap, mounted on the plunger. Loading is a simple process. A lever, situated underneath the main body, is pulled back, a cap having been placed on the plunger head. The plastic missile, soft-tipped for safety, is inserted into the nose and fired by pressing a button on the side of the main body. It is important to stress, however, that the explosion of the cap does not actually propel the rocket, but is designed to give highly realistic sound and visual effects.

The Interceptor, Sales No. 351, has a compact, low body, streamlined for high velocity, but with a rough-and-ready demeanour; enough to make any three-eyed alien shake in its astral boots! It is supported by three rigid legs, mounted on skis, two placed towards the stern and attached to protruding fins, and the other just behind the nose. Its futuristic appearance is further





enhanced by a small delta wing raised above the body on a strong mounting.

The pilot, seated at his highly sophisticated control panel in his space suit, plots his course in his moulded cockpit, protected from the Gamma and other such dangerous rays by a blue tinted canopy, on each side of which the engine inlet grilles are mounted. From the stern, the Interceptor presents a picture of power, resolute and endurable, impressions created by the huge main motor exhaust outlet which is flanked on either side by two smaller manoeuvring jets. The overall effect is one of over-riding strength, spelling destruction to any celestial invader!

Finished in metallic lime green with bright-plated fittings and orange "legs", this fun-packed addition to the Dinky Toy range should receive an enthusiastic response from space-age model collectors.

German Sports Car

Coming down to earth, so to speak, recent motoring statistics indicate that foreign cars have become increasingly popular in this country, already occupying a substantial section of the British market. Indeed, with our present desire to become a more intimate member of the European community, the British car manufacturer could find it difficult to persuade the motorist to "Buy British", judging by the influx of, in some cases, cheaper and more reliable cars from the Continent.

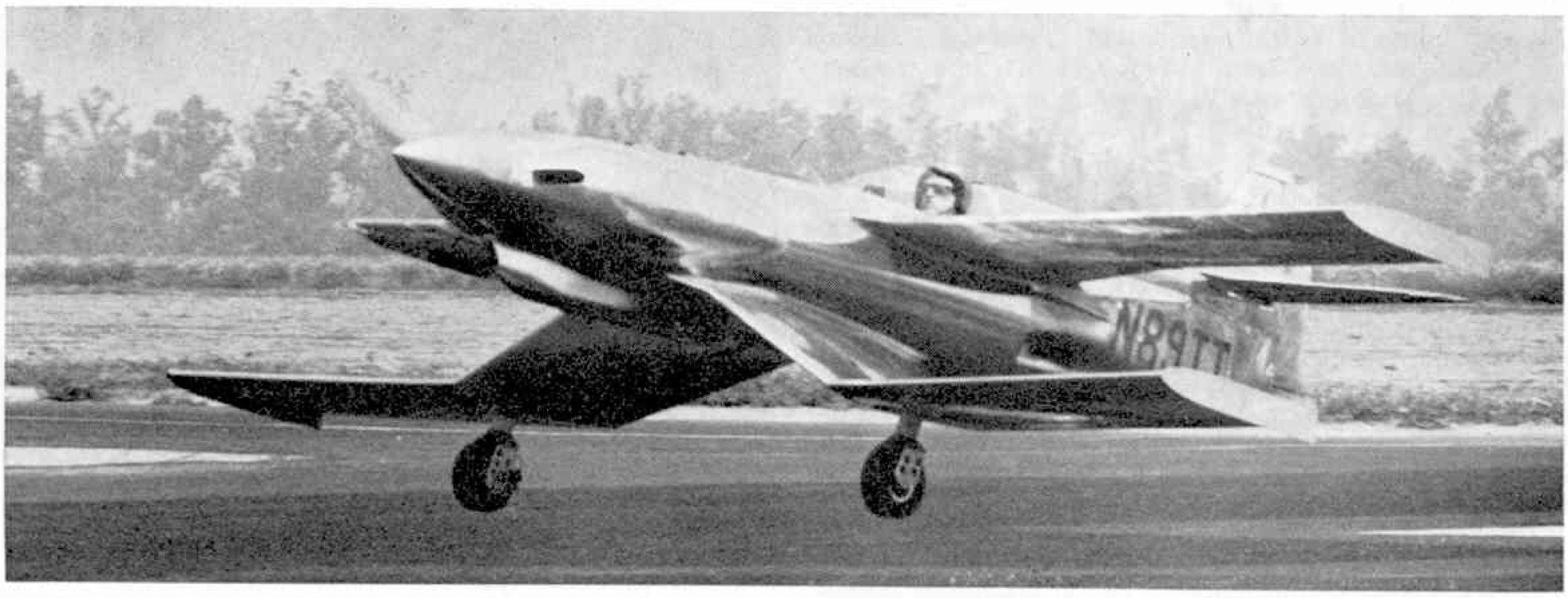
Of course, this could apply to many of our industries, but a fashion for foreign cars particularly, appears to have emerged (amongst those who can afford it!) over the years.

With the aim of keeping the collector in touch with the latest from the Continent, coupled with an eye to overseas exports, Dinky Toys have now extended their range of foreign cars with a brand new reproduction of the Volkswagen-Porsche 914 Sports Car.

Produced by Volkswagen-Porsche of Stuttgart, West Germany, the "VolksPorsche", as it is commonly known, is a 2-seater sports car which is available either as a coupé, or with removable hardtop. It incorporates several unusual features, not least of which is a centrally-positioned engine mounted immediately behind the seats, which leaves room for two large luggage compartments and greatly increases road-holding by offering evenly distributed weight characteristics. The engine itself can be one of two alternative power

(please turn to page 254)

Top: Straight from the Independent Television science-fiction programme, "U.F.O.", the new Dinky Toy U.F.O. Interceptor, Sales No. 351. Left: Disappearing into space, the U.F.O. presents a picture of power with its huge main engine exhaust, flanked by two smaller manoeuvring jets.



AIR NEWS

by

John W. R. Taylor

Lee Mahoney's back-staggered racer

It would be easy to think of Lee Mahoney's Sorceress racing biplane as simply a flying freak. As a start its cantilever (unsupported) biplane wings are back-staggered, which means that the upper one is mounted further back on the fuselage than the lower one. The appearance of the aircraft is then made even more bizarre by the cranked, or " inverted gull " shape of the lower wing. But there are good reasons for adopting such an unusual design, and the Sorceress is so beautifully built that it must be taken seriously.

In one respect it ought not to cause too much surprise, because air racing in America has been attracting weird-looking designs for nearly half a century. Back in the early 'twenties the Pulitzer Trophy races in the U.S.A., as well as the international Schneider Trophy contests, were dominated by the beautifully " clean " biplanes produced by the Curtiss company. Their closely-cowled liquid-cooled engines, in particular, inspired other fine machines such as the British Fairey Fox day bomber and R. J. Mitchell's Supermarine Schneider Trophy seaplanes. By the late 'twenties, however, U.S. designers of high-speed aircraft seemed to have lost the art of creating slim, neat racers.

To achieve the highest possible speed, they simply built the smallest possible aeroplane around the most powerful engine available. The Gee Bee Super Sportster, for example, spanned 25 ft. and was only 17 ft. 9 in. long but had a huge 800 h.p. Pratt & Whitney Wasp Senior radial engine in the nose of its barrel-shape fuselage. Both Super Sportsters eventually crashed, killing their pilots. While they survived they provided a thrilling spectacle, winning the Thompson Trophy races at average speeds of up to 252.686 m.p.h. in the hands of skilled pilots like the famous " Jimmy " Doolittle.

Despite its strange shape, the Sorceress of 1971 has more in common with the lovely Curtiss biplanes than the Gee Bees. It relies on streamlining rather than sheer power for high performance, and can fly at up to 202 m.p.h. although its Lycoming O-290 engine develops a mere 125 h.p. Span is only 16 ft. and length 17 ft., and empty weight has been kept down to 700 lb. by careful use of both resin-bonded and riveted all-metal construction.

The rearward position of the upper wing and cranked lower wing help to give the pilot a good forward view, which is important when hurtling around the pylons of a small racing circuit with a gaggle of other aircraft. The shape of the lower wing has also made it possible to fit short, lightweight main undercarriage legs, despite the use of a fairly large two-blade propeller.

As the Sorceress did not fly until August 1, 1970, it has not yet had an opportunity to test its capabilities against more conventional monoplane racers. Whether or not it proves a winner, Lee Mahoney has every reason to feel proud of his skill in designing and building such a beautiful little aeroplane.

Photos above, by Howard Levy, and below, by Harry Gann, show the distinctive lines of the Mahoney *Sorceress*. Though unusual in appearance, every feature is functional and the overall effect is attractive.





Left: This TriStar will never fly, but it will ensure that airframe stress damage is never likely to endanger its flying sisters.

TriStar will not fly

This *Air News* is being written quite soon after the shock of Rolls-Royce's financial collapse and before any decision has been taken on the future of the company's big RB.211 turbofan engine. Whatever happens it will not affect the future of the TriStar airframe illustrated on this page, because it will never be fitted with RB.211 engines or any others. Even so, it is quite a wonder 'plane, because it will take only two years to complete 36,000 "flights", which a normal airliner with engines would take 15 years to do.

The secret is that this is a ground test version of the TriStar. It will never see a runway or carry a passenger, but is condemned to spend two years in a "torture" rig at Lockheed's Palmdale, California, factory. There 380 hydraulic jacks will pull, squeeze and bend it, to prove that it is strong enough for a lifetime of airline service. By the time real TriStars enter service, after more than 1,500 intensive test flights, this ground test aircraft will have notched up at least 24,000 simulated take-offs and landings. Results of the ground tests will be compared with those produced in flight; but both operators and passengers will gain confidence from the fact that this airframe will always have logged many more hours of tough usage than the real TriStars flown on airline schedules.

Kites can be killers

Kite flying may seem a harmless pastime, but America's Federal Aviation Administration reports that air traffic into several U.S. airports was disrupted last year by pilots having to dodge kites and balloons encountered during landing approach. The main hazard was not collision, but the sudden loss of power that would result from sucking them into the engine air intakes of jet airliners.

Up to last June, the FAA banned from airport approach lanes only kites weighing more than five pounds or moored balloons exceeding six feet in diameter or with a gas capacity of more than 115 cu. ft. Now, it is an offence to fly anything "in a manner that creates a hazard to persons, property or other aircraft", including rockets and free balloons as well as kites and moored balloons. It makes good sense; so, if you live anywhere near an aerodrome, think twice before trying to break any altitude records with even a "toy" kite.



The instrument panel layout of the Short Skyvan experimentally fitted with a Danac controller and automatic picture display.

Skyliner relies on Danac

One of the most interesting experiments carried out in the U.K. in recent months has been an investigation by British Air Services of the possibilities for cheap, regular airline services linking provincial cities and towns throughout the country. Types of aircraft to be evaluated for such an operation were the Short Skyliner, a de luxe 22-passenger version of the Skyvan, the Britten-Norman Islander and the de Havilland Canada Twin Otter, all of which offer STOL (short take-off and landing) capability. The most promising terminal area in London seemed to be a 460-acre site in the mainly-disused Surrey Docks, only five miles from Piccadilly Circus, despite the inevitable protests concerning noise and other difficulties.



The Short Skyliner, a 22-passenger de luxe version of the Skyvan, under consideration by B.A.S. for cheap, regular inter-city services.



Flight test on the Sikorsky S-58T, the twin turbine conversion of a piston-engined machine, which offers better performance at lower cost.

One of the major problems in planning a network of local airline services is that most small airfields have only limited navigational and approach aids, which restricts all-weather flying. To overcome this drawback, British Air Services have used a Skyliner fitted with Decca's new Danac area navigation equipment. This includes a moving-map display on the instrument panel, which shows the position of the aircraft, accurate to within a few yards, from ground level up to any altitude in cruising flight.

Danac makes possible virtually automatic navigation from take-off to touch-down, in bad weather or poor visibility, enabling aircraft not only to fly routes which do not coincide with the main airways but to provide feeder services on to and off the airways.

Sikorsky updates the S-58

It is many years since Westland, in the U.K., first fitted turboshaft engines in the Sikorsky S-58 helicopter to produce the Wessex. Sikorsky themselves always seemed to be too busy to build a comparable version of their famous "workhorse chopper". After completing their 1,821st and last S-58 in 1969, however, they seem to have decided that the time had come to offer a turbine conversion of these piston-engined helicopters, and the result is the S-58T.

Except for its redesigned nose, there is little to distinguish the "T" from its predecessors. The two Pratt & Whitney PT6 shaft turbines and combining gearbox that make up its Twin Pac power plant fit neatly behind a pair of clam-shell nose doors, surmounted by two rectangular air intakes. Overall length is 26 inches greater than that of a standard S-58; but apart from the installation of turbine controls and instruments, the rest of the airframe is unchanged. Maximum power available from the Twin Pac is 1,800 h.p., but only 1,450 h.p. are used in the S-58T. This means, of course, that there is a big power reserve, and the full 1,450 h.p. can still be relied upon in temperatures of up to 95 degrees Fahrenheit. With one engine out of action, the S-58T can maintain level flight at its full loaded weight at an altitude of 1,700 ft. on a hot day, or at 7,500 ft. on a standard day.

The improved performance is a tremendous attraction for operators in "hot and high" places. Maximum speed is 123 m.p.h. and cruising speed 115 m.p.h. over a normal range of 300 miles. More important, when the temperature is so high that a piston-engined S-58 would have to limit its payload to 2,800 lb., the "T" can carry its full 5,000 lb. payload of freight, or 15 passengers, without difficulty.

To get production under way, Sikorsky have bought 30 surplus S-58s from the French Air Force for conversion to turbine power. They have also received orders from present commercial operators of the piston-engined version who would like to take advantage of the opportunity of updating their aircraft for many more years of useful and economical service.



Hardly any major alteration is necessary on the S-58 to fit twin turbines; spotters will tell the difference by the slightly longer nose, the two squared nose intakes and, of course, the different noise.

STAMPS

(*Continued from opposite page*)

In honour of the fiftieth anniversary of the Nineteenth Amendment, the United States released a 6c stamp in 1970 depicting a "before and after" scene of suffragists in 1920 and a woman of the present day operating a modern voting machine.

The latest stamp in this theme comes from Sweden and portrays Kerstin Hesselgren, the country's most outstanding politician, who became Inspector of Employment in the Swedish Upper House in 1921. The 45 ore and 1 krona stamps were released in booklet form on February 19th.

ASPHALT LAKE

(*Continued from page 221*)

the oil-well type was used was crowned with success; to put it concisely, steam was forced into the centre of a three-inch pipe, melting the asphalt as it sank down, helped on its way by rotation from the derrick platform. These soundings, taken across the lake in two directions, revealed that the lake lies in a bowl-shaped depression, 286 feet deep in the centre, and is filled with a uniform mass of asphalt. Long may it be that this apparent "bottomless pit" will yield its valuable product for the benefit of road-users, be they on business or pleasure bent.







STAMPS Women's struggle for the right to vote or hold office recorded on stamps from many countries. By J. A. Mackay

FRANKENSTEIN AND WOMEN'S SUFFRAGE may seem totally unrelated subjects, but they both owe their existence to the same person—Mary Wollstonecraft. She is best remembered today for her novel about a man-made monster (written at the age of 17, on her honeymoon with the poet Percy Bysshe Shelley!) but she deserves recognition also for her pioneer efforts on behalf of votes for women. Her book *A Vindication of the Rights of Women*, published in 1792, inspired the French Revolutionaries to grant votes to women but it was many years before her own country recognised that women should be allowed a voice in politics.

In 1865 John Stuart Mill was elected to Parliament and made votes for women part of his election policy. His speeches inspired the Kensington Ladies' Discussion Society the following year to adopt parliamentary suffrage as part of their policy and in this small way the great movement for female emancipation began. In 1869, as a result of agitation, votes in municipal elections were given to women rate-payers but another fifty years were to pass before women had the right to elect members of Parliament. When the county councils were established in 1888, women were allowed to vote but were not eligible to hold office. A further thirty years elapsed before an act was passed enabling women to hold office, the first woman to do so being Elizabeth Garrett Anderson who was elected mayor of Aldeburgh in 1908.

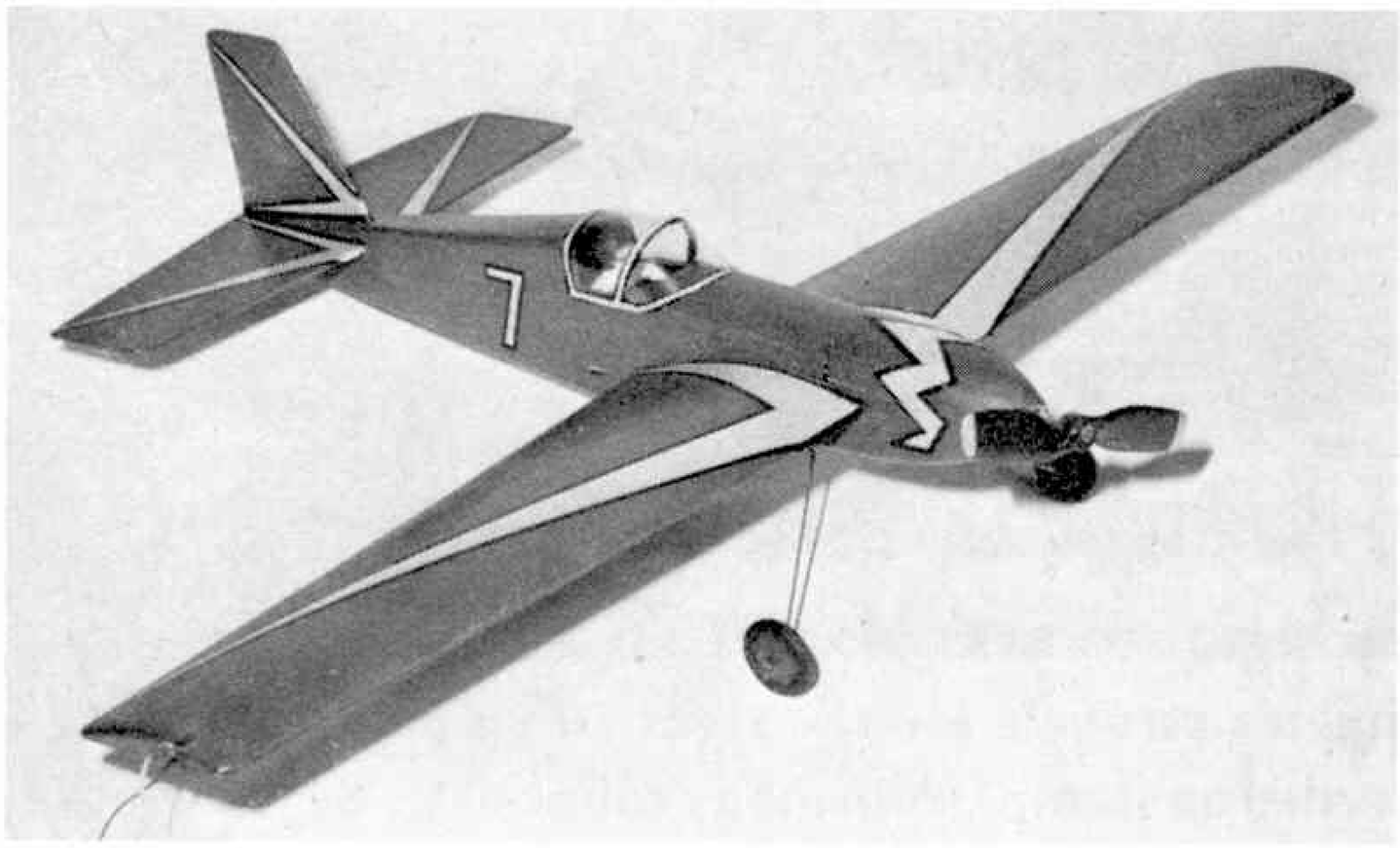
Parliamentary suffrage became an active issue in 1897 when a National Union was formed under Mrs. Henry Fawcett, followed by the more militant Women's Social and Political Union led by Mrs. Emmeline Pankhurst. Both suffragists (the moderates, including many men) and the suffragettes (the feminist militants) agitated increasingly in the years prior to the First World War. Many suffragettes were imprisoned and went on hunger strike. Bills were introduced in Parliament in 1910, 1912 and 1913, but were narrowly defeated on all three occasions. The problem was shelved during the war, but an act was passed in 1918 extending the franchise to women over the age of 30. A further act, in November 1918, enabled women to become members of Parliament.

The 50th anniversary of votes for women was celebrated by a 9d. stamp, issued in May 1968, depicting the statue of Mrs. Pankhurst. The first woman elected to the House of Commons was Constance Gore-Booth, Countess Markievicz, but she refused to take her seat and thus Lady Astor had the honour of being the first woman MP to enter Parliament. Countess Markievicz, a member of the Anglo-Irish aristocracy, was condemned to death for her part in the Easter Rising but was later reprieved and amnestied in 1917. She was elected Sinn Fein MP for the St. Patrick's division of Dublin in the 1918 General Election, but along with the other Sinn Fein MPs boycotted Westminster and formed the Dail Eireann in Dublin instead. Countess Markievecz was portrayed on two Irish stamps issued in 1968 to mark the centenary of her birth.

Although Britain was one of the first countries to give votes to women, several Commonwealth countries did so earlier. New Zealand granted votes to women in 1893 and the Canadian provinces did so between 1902 and 1917. Federal votes were given in 1917 and the 50th anniversary was marked by a 5 cents stamp with a symbolic design. Many European countries followed Britain's lead after the First World War. West Germany issued a miniature sheet in 1969 containing three stamps portraying prominent suffragists of 1919—Marie Juchacz, Marie-Elisabeth Luders and Helene Weber.

In the United States the ideas of Mary Shelley were adopted by Lucretia Mott and Elizabeth Cady Stanton who organised a Women's Rights Convention at Seneca Falls, New York, in 1848. The centenary of this modest beginning was marked by a 3c stamp inscribed "100 Years of Progress of Women" and portraying the founders of the movement, along with Mrs. Carrie Chapman Catt who died in 1948. Mrs. Catt worked for the extension of the suffrage to women, not only in the United States but in many other parts of the world and was president of the International Women's Suffrage Alliance. In 1935 the twelfth congress of the Alliance was held in Turkey which issued a long set of stamps portraying famous suffragists including Mrs. Catt. Another American suffragist was Susan Anthony who worked with Mrs. Catt to secure the Nineteenth Amendment to the Constitution—votes for women—which became law in 1920. The sixteenth aniversary of this amendment was marked in 1936 by a 3c stamp portraying Dr. Anthony, who was also portrayed on the 50c stamp in the Famous Americans definitive series of 1955. Her place on this denomination of the 1968 series was taken by Lucy Stone who founded the Women's Suffrage Association in 1869.

(*continued opposite*)



Electric R.T.P. Flying

Part One — with full-size plans of Vic Smeed's "WATTSNAME"

ELECTRIC ROUND-THE-POLE FLYING dates back a few years—possibly the first large-scale demonstrations were at the Dorland Hall exhibitions in London twenty-five years ago. However, these models required specially built motors, and despite occasional attempts by individuals, and one kit model in about 1947, interest languished until in 1968 various of M.A.P. staff experimented with slot car motors and an assortment of prototype models to see if a simple combination could be found for demonstration at the Model Engineer Exhibition.

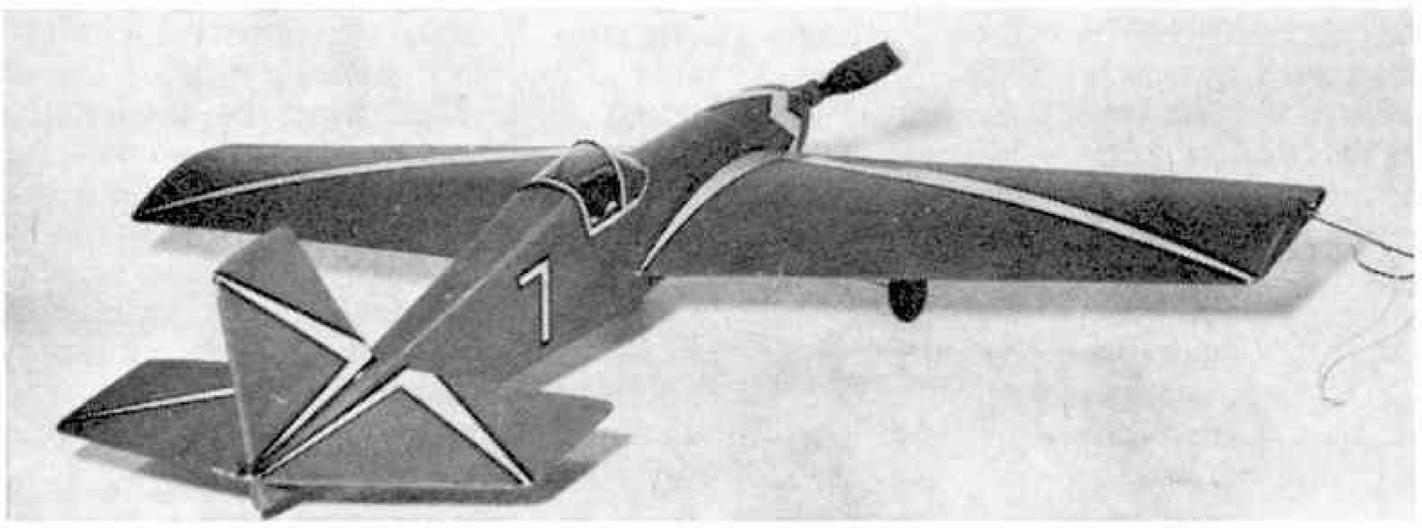
It took about a dozen models by four or five different people before success was achieved, but once the path to follow was found, few succeeding models had much difficulty. Since that time, several clubs have taken electric flying up, and as a result a fair amount of development has taken place. Our original aim was to fly on 12 ft. lines, but one club now flies on lines up to 46 ft. long and finds that the longer the lines, the less exacting is the model required.

We will come on to the lines and the pylon head in the second half of these notes, next month, but for those who have heard little of this type of flying, we can perhaps mention that the pylon head is mostly simple Meccano and that besides aircraft, lines, and pylon the only requirement is a controlled power source, which can either be a 12v car battery and model slot car hand controller, or a model railway transformer/rectifier able to deliver 1½ amps. Also needed is a space large enough to fly in, and we recommend a minimum circle diameter of 20 ft., so unless your house has very big rooms, flying must take place in a church or school hall, Scout hut, or similar, or in the open air, provided there is very little breeze and a smooth surface on which to land and take-off.

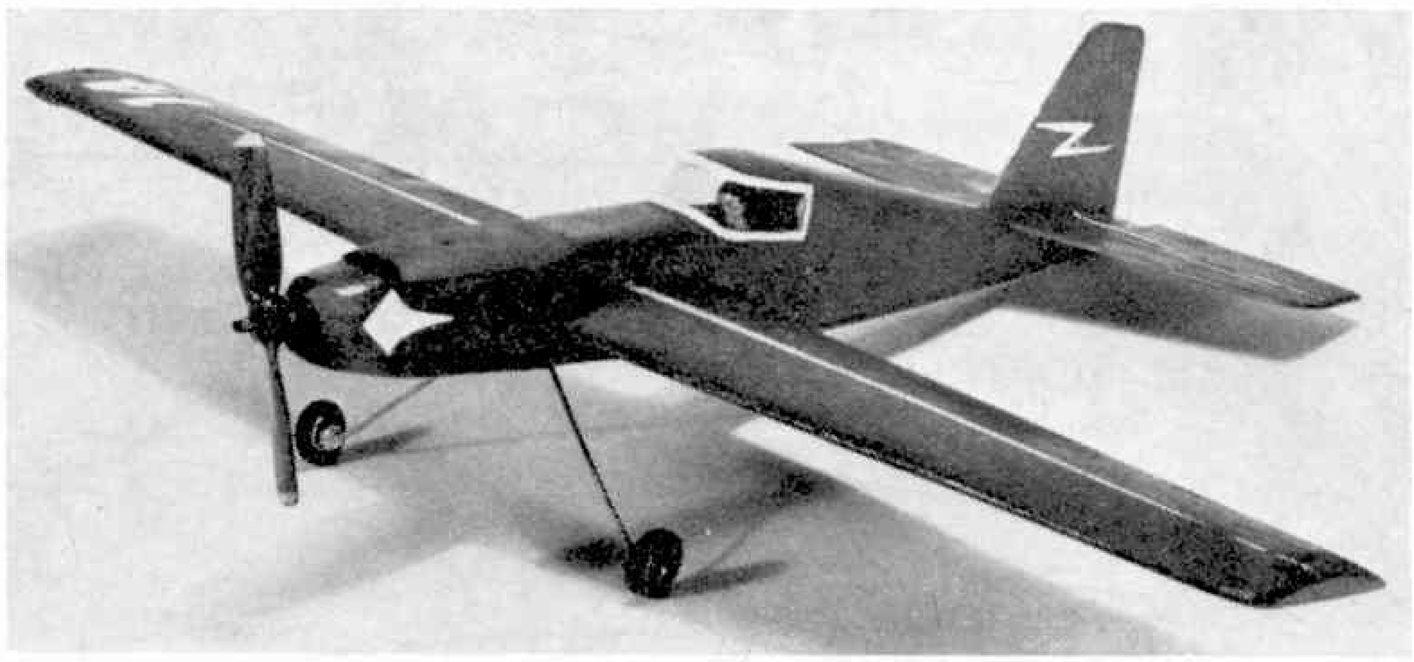
Now to the model. This was the fifth design by the writer, based on experience with the previous four (and some from many years ago), and also observation of a number of other models. The original was built and heavily used at the 1969 M.E. Exhibition, where it was easily the fastest model of the twenty or so flown. It survived rough handling by novice pilots and flew again in 1970, when it became so battered that it was retired. A second model was built for this year's show, and again proved the fastest of a large number of models, even when re-engined by a "cheap" motor. It therefore seems that the design is responsible for the performance, rather than a good motor in the first model. The two points contributing most are light weight—just under 2¼ ozs. complete—and the tapered nose, which allows all the propeller area to be effective. A fat-nosed model blankets much of the prop, and though larger props can be used, it is then better to use a gear reduction which makes the model a little more complex.

Initially, we used Rikowhip motors, costing close to £2 each and, we understand, no longer made. Actually, any good 16D size slot car motor should be suitable but we would suggest that a figure of about 60p should be the minimum you should expect to pay. Anything costing less than this is unlikely to have a high enough performance. The inexpensive motor we found very successful was the Rikochet, available at the time at about 65p.

What you need, then, is the motor, two sheets of $\frac{1}{16}$ in. × 3 in. balsa (one very soft, one medium to soft),



Pictures on this page show the original model. Only difference, apart from the colour scheme, is the cabin construction, made up of two pieces of acetate instead of one single wrap-round piece. If you prefer it, simply cut the top rear ¼ in. panel off at the back of the cockpit and fit the overhead acetate first. Leave to dry before adding the front screen.



The second model, with cabin as on drawing. Operations on the nose to change motors rather spoiled the lines. The first motor burned out after repeated dunkings in the pool round which it was flown at the M.E. Exhibition, due to inexperienced flyers climbing it too high and hitting an overhead sign!

a Cox .010 3 in. propeller, a stub of 12 g brass tube, a pair of wheels, a few inches of 20g. piano wire, a small piece (about 12 × 1 or 6 × 2 in.) of very soft ¼ in. balsa, two press studs, a couple of feet of fine hook-up wire, washers (to hold the wheels on), cement, sanding sealer, colour dope, and just a dab of epoxy glue.

Construction starts with the wing, which requires the sheet of very soft 1/16 in. Trace or pin-prick the outline and cut out; the bottom panel should be just a shade under the full width of the sheet. Use this panel to mark out the second, which is the full width. The slight difference in width allows for the curve of the top panel. Trace and cut out the six ribs and cement them to the bottom panel, pinning it down on a flat surface. Nick the ribs to allow the two wires to pass, and cement them in place, poking the ends out through two small holes so that they can later be soldered to the press studs which will be cemented on the outside. Make sure you put them in the right wing! The wing will have to be pinned down with its tip projecting over the edge of the board once the wires are through. Leave a couple of inches spare on each wire at each end. Also fit the wire tethering eye, which needs to be firmly cemented in place.

Now sand the bottom panel to a chamfer all the way along the leading and trailing edges, sanding the ribs as well if they happen to be a little long. Run cement right round the outline and across each rib, then place the top panel in position and pin down with either weights or pins pushed through at a slight angle, every inch or so. Make sure that the two panels are in smooth contact all round, and leave to dry. Note, incidentally, that the wing has no dihedral, i.e., it is flat from tip to tip.

Trace and cut out the fuselage sides from medium to soft 1/16 in. sheet; be careful to get the wing and tailplane seats accurate to the drawing. You can also cut out the tailplane, B1, the fin, and sub-fin from this sheet.

Cut a short length of 12g brass tube (length as on plan) and file the ends clean. Scrape inside one end with a piece of wire, then put on a tiny amount of epoxy resin and slide it on to the motor shaft. Don't let resin get near the motor case. Run the motor on a dry battery (or up to 12v power source) to check that the tube is dead in line, and leave in a warmish place for at least 24 hours.

Now unpin the wing and sand it lightly with fine glasspaper, rounding the top surface at leading and trailing edges as shown on the section. Check that the centre cut-out just accepts the motor. The fuselage sides must now be slid on to the wing, one from each end. Place the motor in the wing cut-out and slide the sides up to it; slip a rubber band or narrow strip of adhesive tape round the sides and motor to keep it in place temporarily. Cement B1 in, then cement the fuselage sides in position on the wing, tight up to the motor. Leave to dry thoroughly after first checking that both sides are " square " to the wing and that the tail ends are level.

Cut the ¼ in. block that fits under the wing centre and cement in place, also the 1/16 in. cockpit " floor " if required, then bend up the undercarriage. Start bending from the middle, which makes it easier to get a good fit and also to get both legs the same. The wheels can be soldered on before attachment to the fuselage, or later.

Remove the band or tape from the motor, slide it round, and solder the two wing wires to the brush terminals—it doesn't matter which goes to which. Just a quick touch with a really hot small iron and resin-cored solder is all that is needed, but check that the joints are good, as it is not easy to get to them without cutting the model up once it is finished. Solder the other ends of the wires to the two No. 2 press studs, cement the studs in place, then try the motor on a dry battery to see that it spins.

Push the motor back in position and replace the band or tape, then cement the undercarriage in place. Make a thorough job of this. The bottom of the fuselage can now be covered with 1/16 in. sheet (remember to take the motor band or tape off) and the tail ends cemented together and held by a pin or clothes peg at the tip.

Cut some very soft ¼ in. filler pieces for the nose and fit in place; cut the top front ¼ in. piece and cement in at the same time. Lay the tailplane on its seating and check that it is parallel with the wing when viewed from the nose. Trim the seating carefully if not. Cement in place, checking it is square from above. Cover the rear underside with 1/16 in. and finally fit the ¼ in. top rear decking. Leave to dry, then carefully pare and sand the fuselage to finished shape.

Cement on fin and sub-fin, checking that these are truly vertical and aligned properly fore and aft.

When dry, sand the entire model with very fine glasspaper or garnet paper and apply one or at most two coats of sanding sealer. Sand off the sealer almost completely, and apply one coat of thin colour dope. Paint the inside of the cockpit to contrast, and add a pilot, if required. A suitable pilot can be made from a 1/24 slot car driver.

Now cut a paper pattern for the windshield and when satisfied cut out a very thin acetate copy. Cement in place carefully. Add any colour or transfer trim but avoid adding too much weight.

All that remains is to epoxy the propeller to the shaft and then we can turn our attention to the pylon head, to be described next month.

3" COX PROP EPOXIED TO TUBE

FUSELAGE SIDES 1/16" SHEET

SOFT 1/4" SHEET

B1

MOTOR

FILL WITH 1/4" SCRAP

1/4" SHEET BENEATH WING

LIGHT CHAMFERS ON LOWER WING PANEL

12 G. BRASS TUBE EPOXIED TO MOTOR SHAFT

TRUE LENGTH

2.3/8"

UNDERCARRIAGE 20 S.W.G. WIRE

R1

NOTE WING BOTTOM PANEL IS 2.15/16" MAX. CHORD. CUT TOP PANEL FULL 3" WIDTH

LEADING EDGE

R2

SCORE AN
CRACK ELEVAT
ONLY IF NEED
ON FLIGHT TES

NOTE WING LAYOUT IS FOR CLOCKWISE FLYING

R3

MOTOR

WIRE EYE

R3

No.2. PRESS STUDS BENEATH

TAILPLANE

1/16" SHEET

R2

B1
1/16" SHEET

NICK STBD. RIBS FOR WIRES

R1

SOLDER TO MOTOR TERMINALS

THIN MULTI-STRAND HOOK-UP WIRES CEMENTED LIGHTLY TO LOWER PANEL BEFORE FITTING TOP

R3

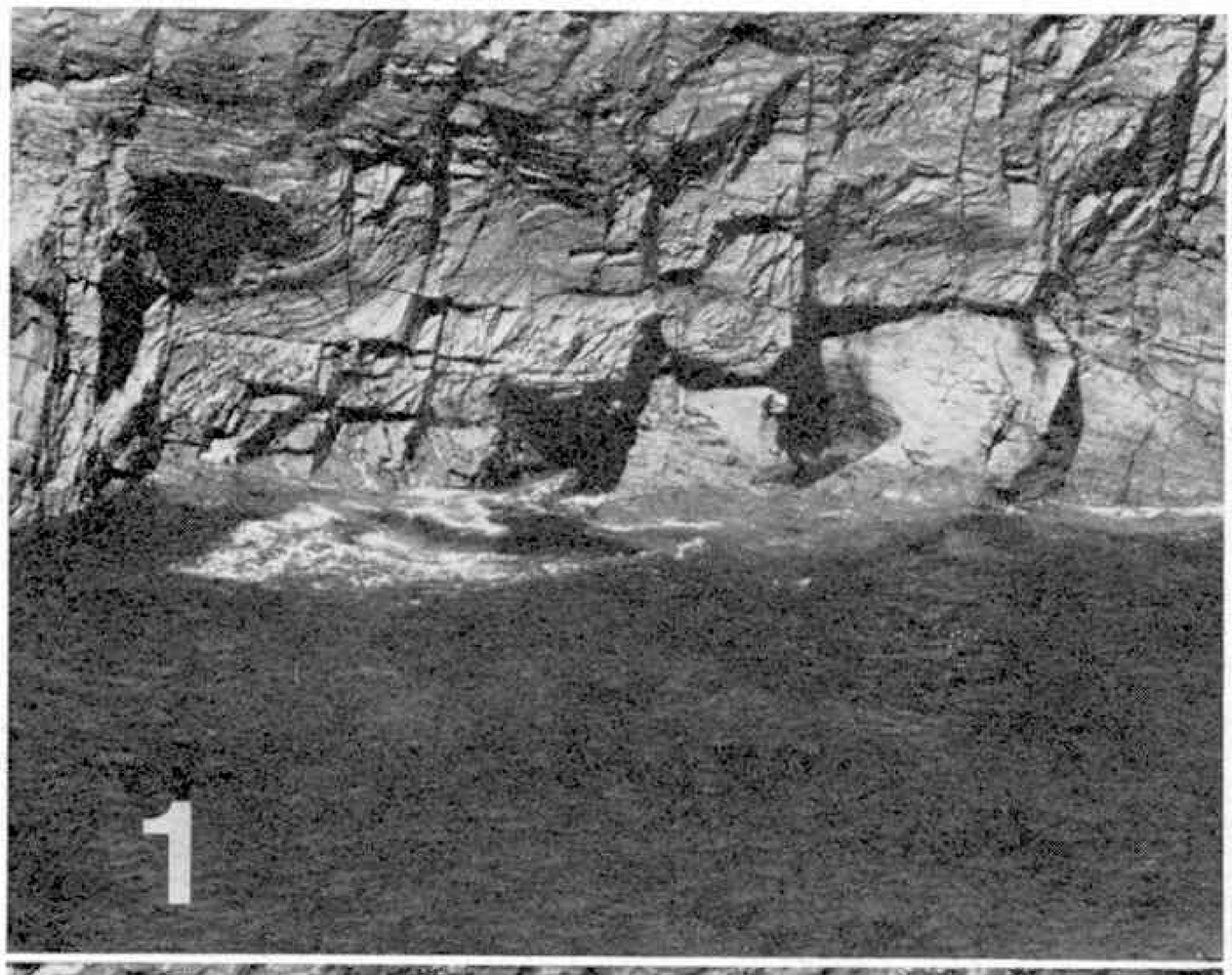
R2

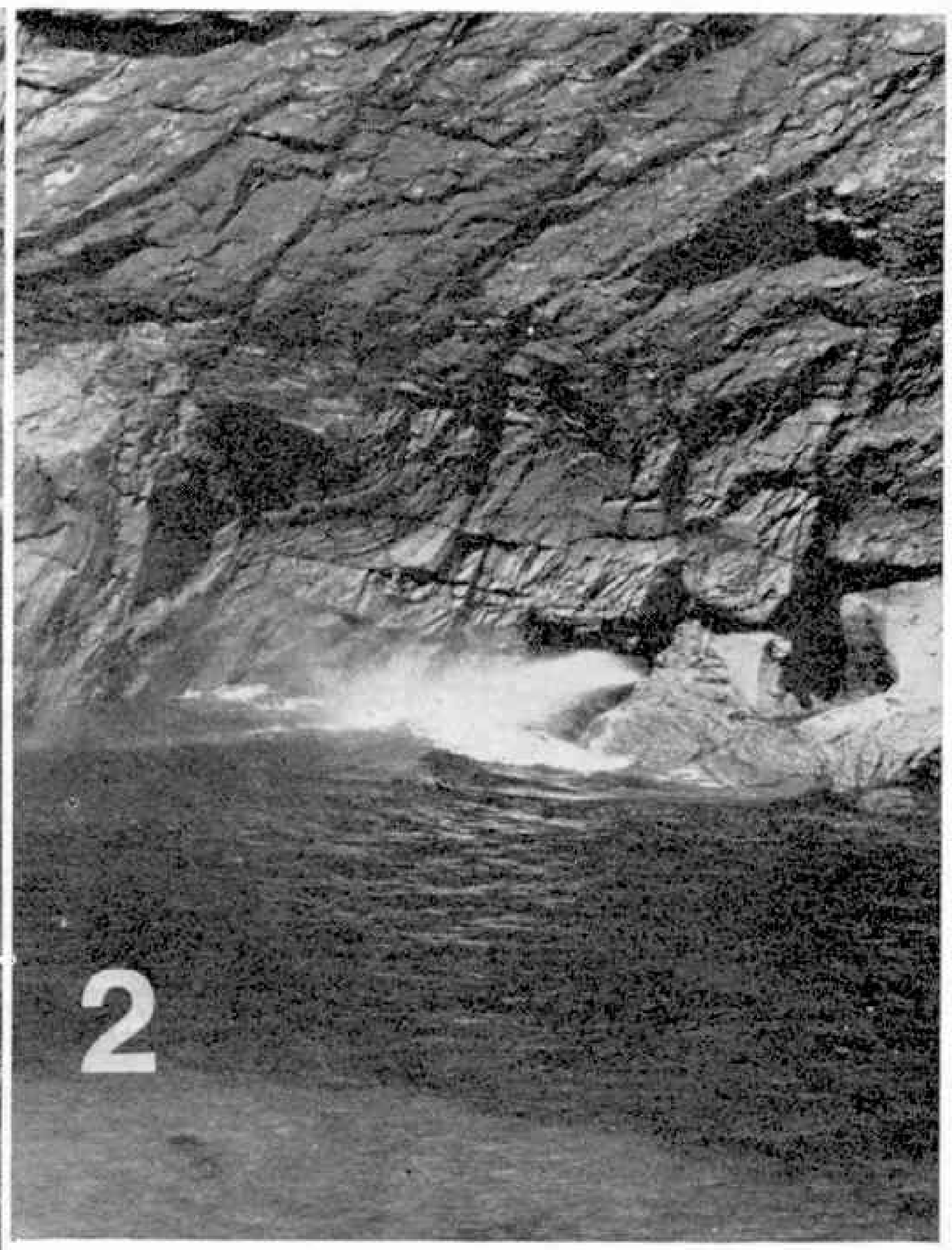
R1

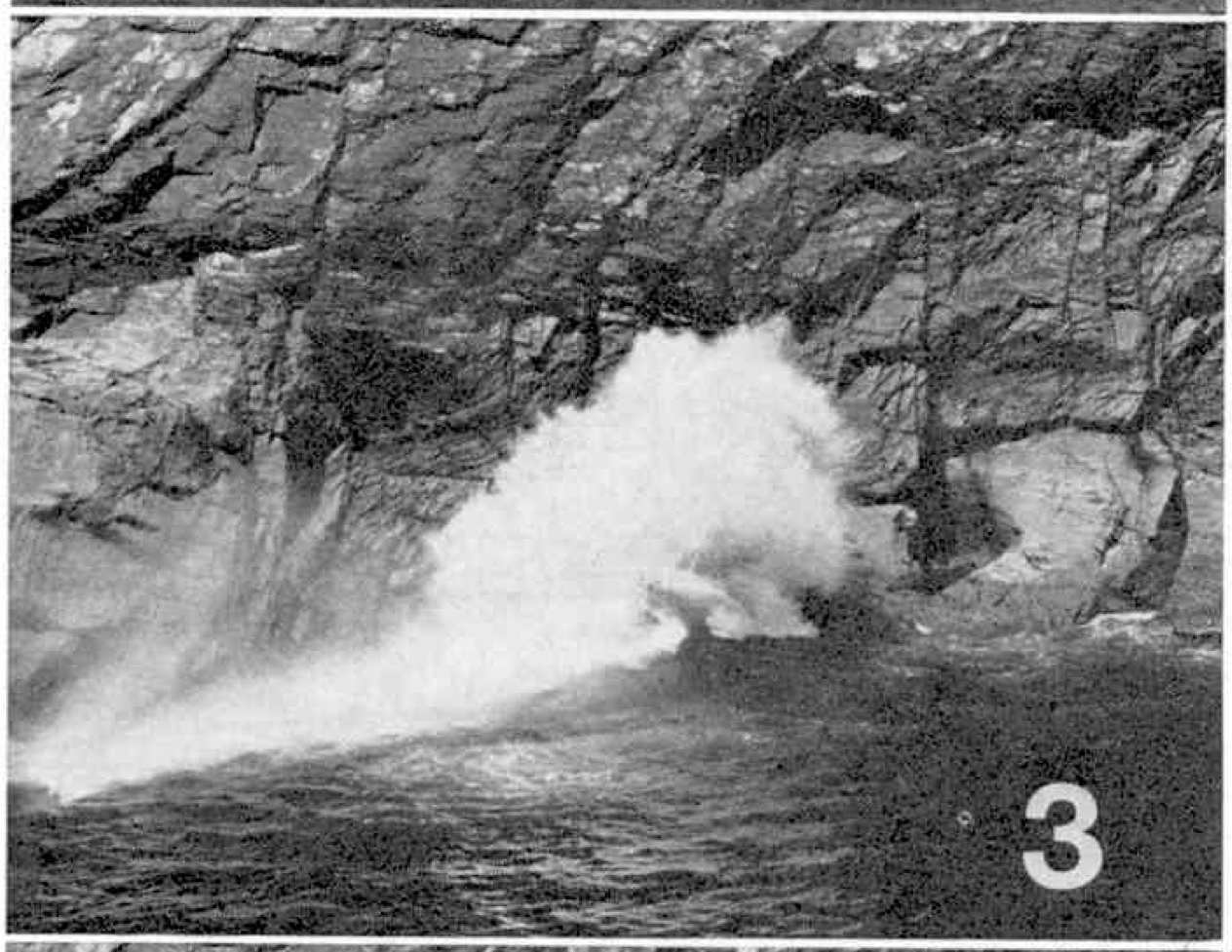
RIBS 1/16"

TAILPLANE 1/16" SHEET

AND
TORS
DED
ESTS



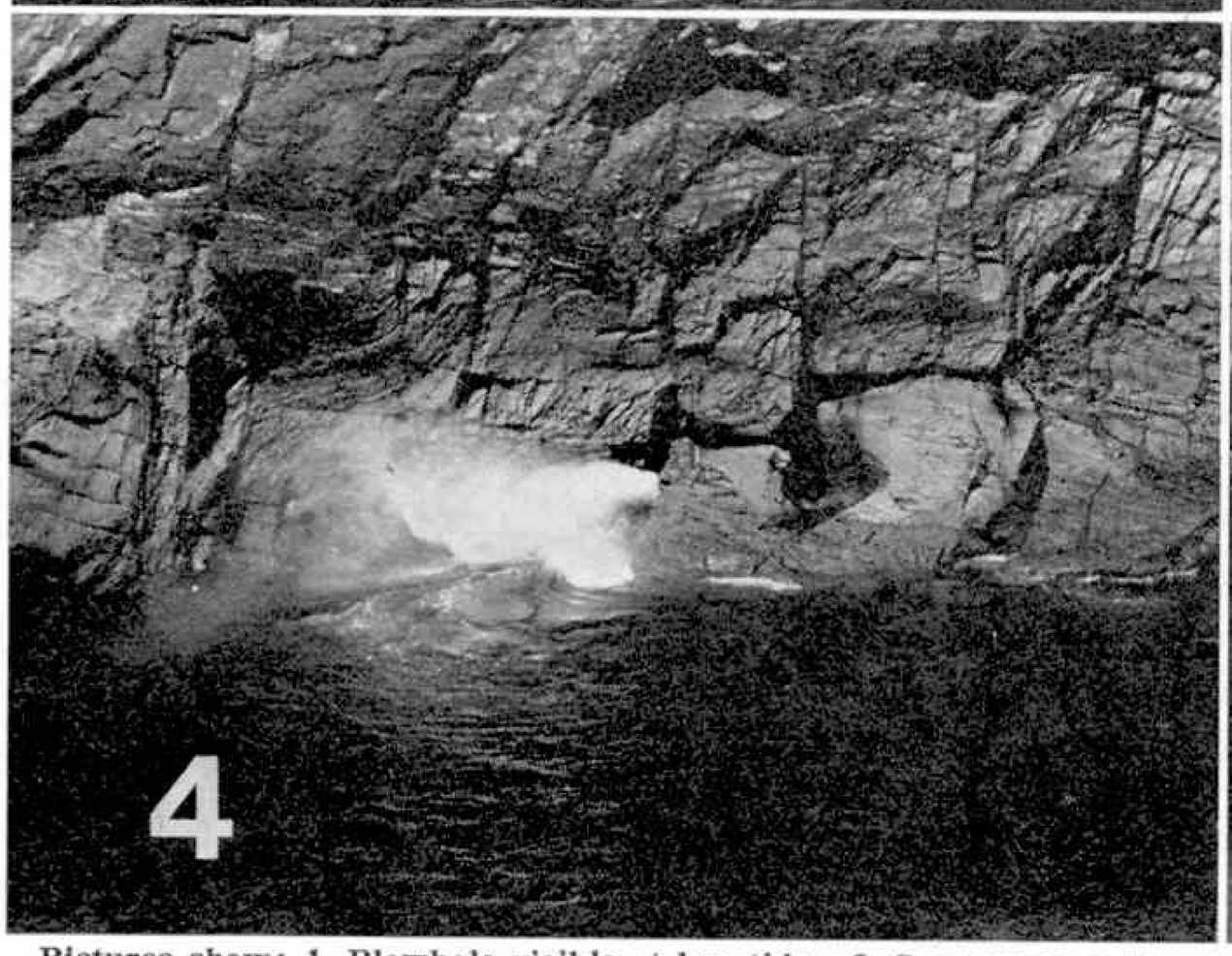


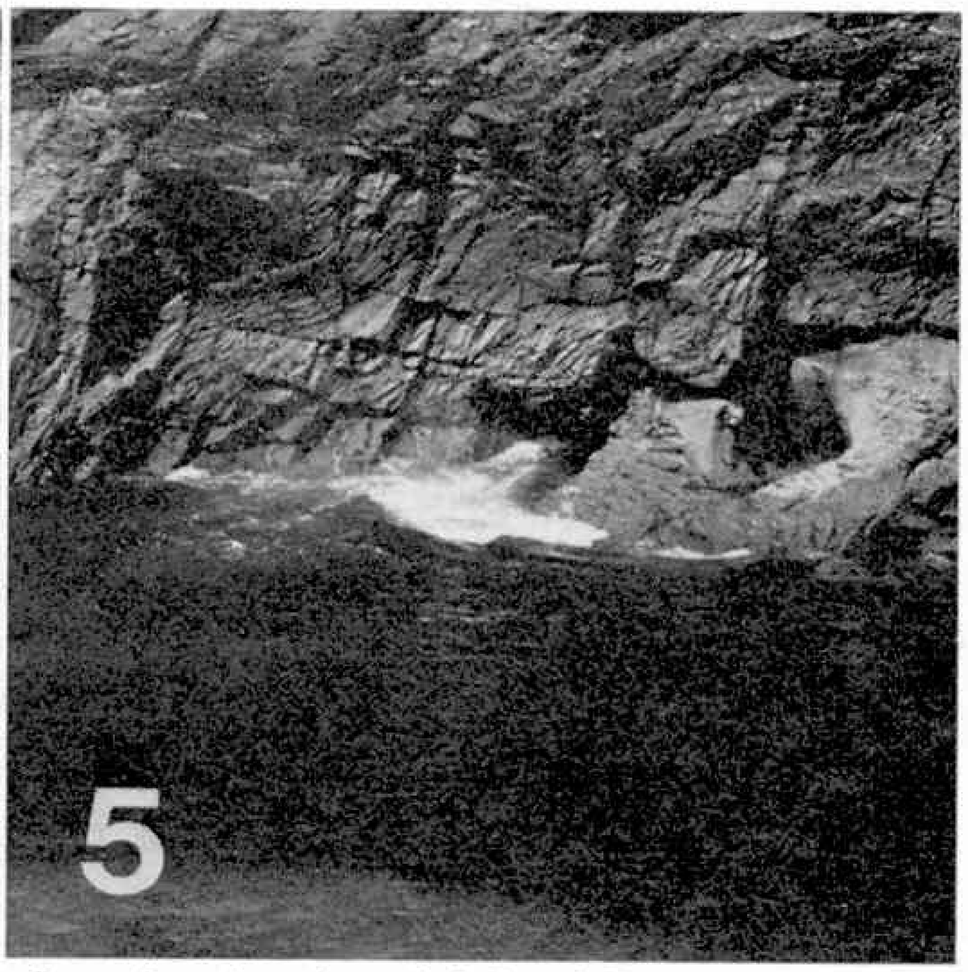


"THAR SHE BLOWS" by Edyth Harper

Here and there round our coasts, a curious phenomenon occurs in a natural blow-hole. An hour or so before low tide, one such blowhole can be seen in a cliff at Boscastle, Cornwall. This has been caused by the sea entering an underwater opening. At regular intervals pressure forces a spout of spray up through the hole for a considerable distance. A loud booming sound occurs and can be heard a good way away.

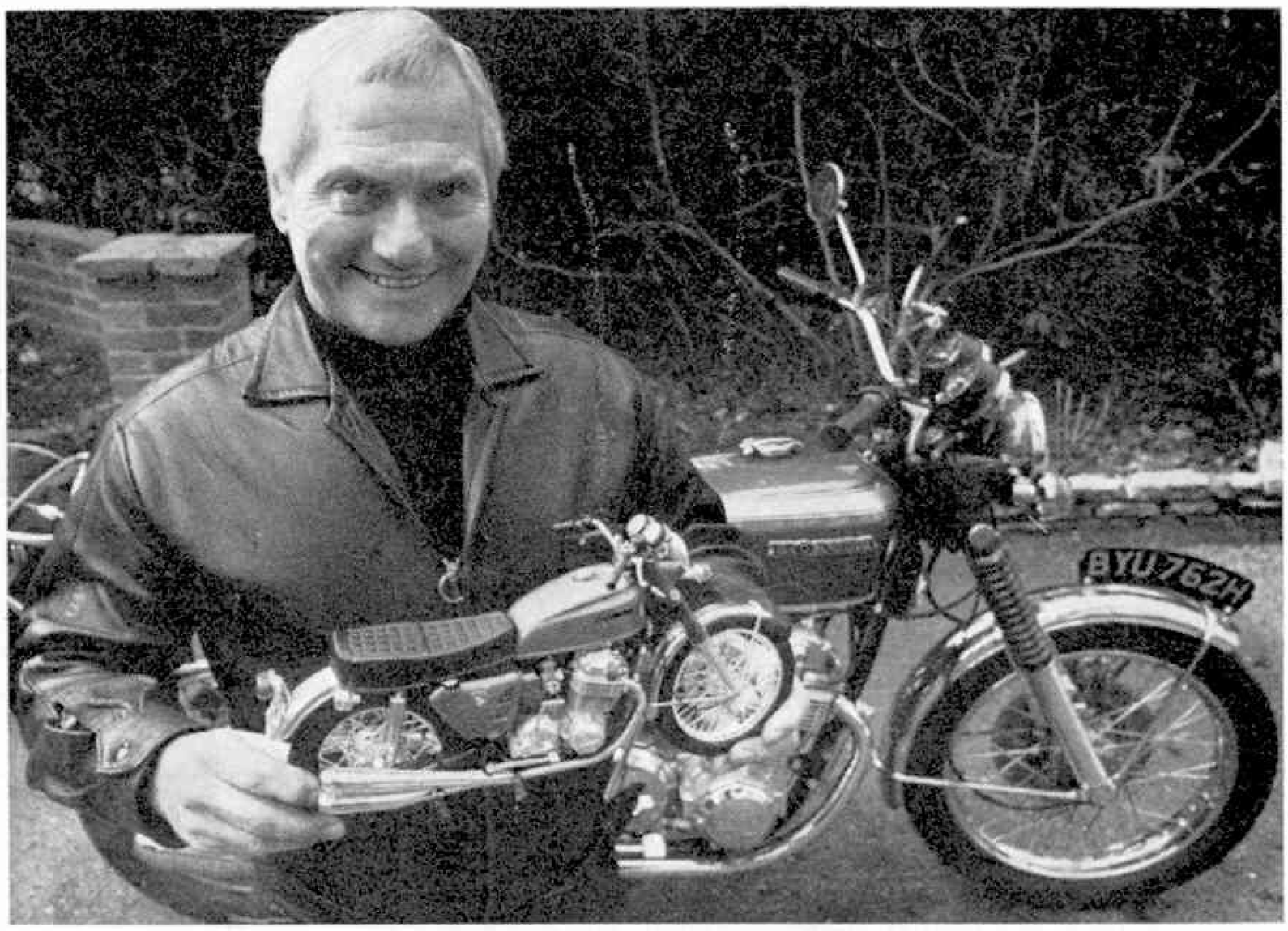
Once the fountain of spray has reached its peak, the remainder is sucked back through the hole. A short period of calm, about fifteen seconds, follows, then the whole sequence takes place again, making a fascinating display to watch.





Pictures show: 1. Blowhole visible at low tide. 2. Sea enters cavity. 3. Spray forced up through hole. 4. Pressure subsiding. 5. Ready for the next cycle.

Famous TV comedian Dick Emery builds the Tamiya kit of the 750 c.c. Honda Four



Dick Emery's Review

THIS month as promised, I set about building what in my opinion is the most exciting kit yet from the Tamiya Company. You might have noticed on my BBC television series I sometimes use my powerful 750 c.c. Four Honda motor-cycle and it is a near perfect 1/6th scale replica of this machine which is being launched in this country's model shops about now. My example was one of the early pre-production kits supplied by Richard Kohnstam Ltd., and thus had the disadvantage of Japanese instructions. However, the illustrations were an excellent guide and I am assured that all kits on sale will have English additions.

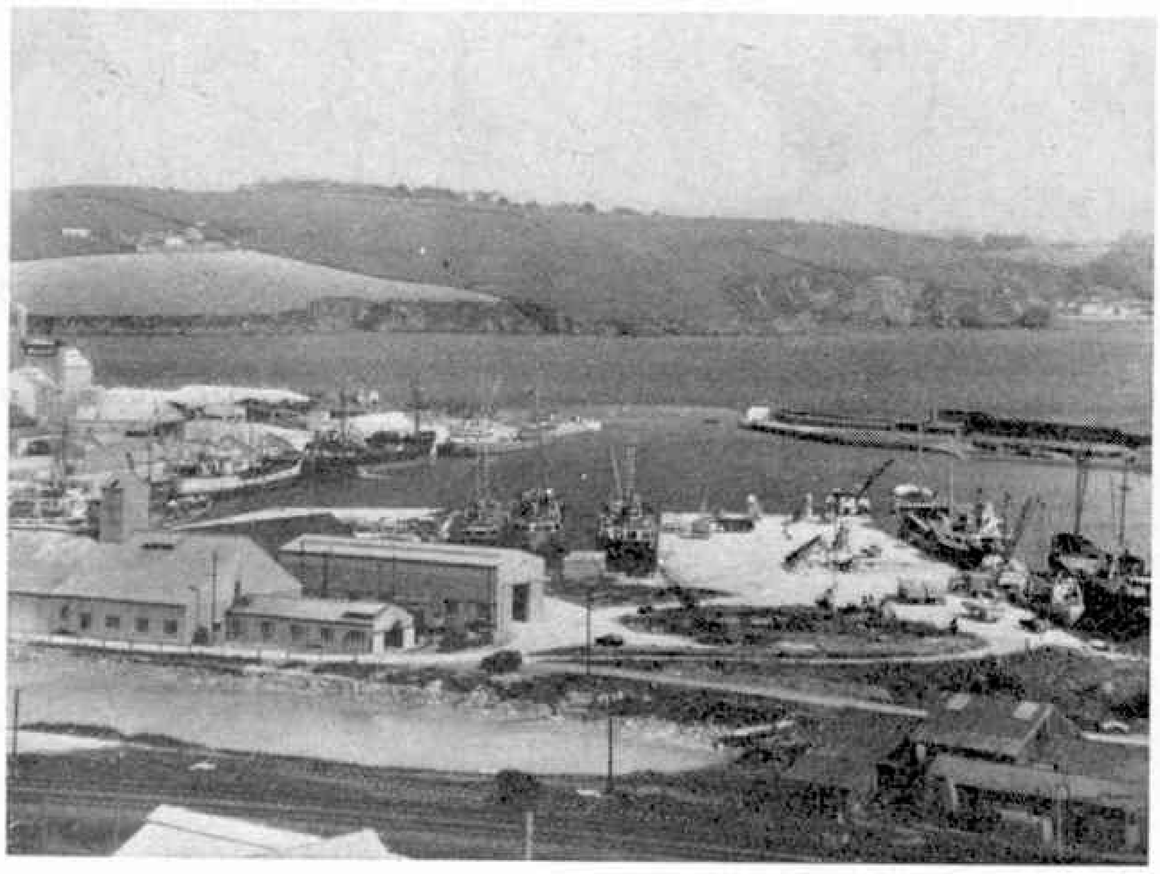
At £7.99 this is an expensive kit and for that sort of money I expected a good deal, particularly after building their Lola T 70 at £7.00. Both front and rear suspension works faithfully, there are well moulded semi-pneumatic tyres and an incredibly perfect chain. But really what you are paying for is the sheer excellence of the moulded detail, even the small replica battery has to have each plate installed. I asked Honda (UK) to fault the finished kit and the best they could do was find a red warning light on the miniature controls which is not on the full sized production bikes. Indeed, they though the engine moulding and detail was on a par with their own !

A great many kits claim to be for ' the advanced modeller ' and prove to be quite straightforward. This Honda is, however, really for enthusiasts with both skill and patience. Be warned, you are tested right from stage two in the instructions with the construction of the chain from 306 tiny metal and plastic parts. From there you move on to the front forks and suspension together with headlight, flashers, dials, mudguard and handlebars. Following that, there are four very rewarding stages piecing together the engine block and detail. In real life my Honda's engine both looks and sounds magnificent and the kit, though naturally without moving parts, still looks the immensely powerful thing it is.

The next stage is to place together the pieces of the frame and add to this the rear mudguard, rear shock absorbers and prepare the fuel tank and electrical gear, including perfect little plug caps. After that the halves of the chromed wheels are glued into place, together with the front wheel disc brake and rear gearing, and tyres slipped into place. The frame then gets its stand, pedals, battery and the power unit. Squeezing the model engine into place makes me realise how much designing must have taken place to get the real unit mounted properly. The wheels are offered up into place and the chain nestled into the teeth. Side tanks, throttle and gear controls are fixed and the four massive exhaust systems eased home.

The model then is nearly complete. The seat is hinged into place and mesh stuck behind the vents in the side tank covers. I finished my kit in Humbrol metallic blue, which was a near match to my own bike, but the kit comes in well coloured plastic and the chromework is really excellent.

There are in fact quite a number of different materials supplied with the kit, all well displayed in bubble packs and separate polythene bags. The seat and wheels are of rubber, the front mudguard is really chromed metal; brass and steel is used for springs, wheel shafts, suspension covers and the chain links. There are the usual clear plastic and amber flasher pieces, five stems of well chromed plastic parts, two black plastic, one in the colour moulding for tanks, covers, etc., and one in black rubber with excellently moulded foot rests, handle bar covers, the passengers seat grab-strap and those spark caps. Everything, in fact for a near perfect model. Most kits available are as good as the number of hours you want to put into it. With this one you *NEED* to put quite a few in but the resultant model openly impressed Honda themselves and certainly will reside on my mantelshelf. Come to think of it, if Tamiya conceive any bigger scales I'll need another garage. . . .!



Cornish China Clay

A major West Country industry

By R. Angove

VISIBLE FROM LAND AND SEA and prominent on the green, undulating surface of Cornwall are numerous lofty, white cones of quartz-sand. These 'Cornish Alps' as they are sometimes known, often the foreign visitor's first view of Britain, are a familiar sight to regular channel voyagers from whom they scarcely evoke comment.

Road travellers, too, driving along the A30 trunk road pass the 'Hawks Tor' works at Bodmin. Many more become visible as they approach the barren moors of mid-Cornwall.

These white 'Pyramids', many of them over 100 feet high, are the residue from some of the world's most extensive China Clay quarrying operations and are a direct result of a Quaker chemist's dream of producing fine porcelain.

Devon Alchemist

Many readers will recall the story of William Cookworthy who, in the 18th century, discovered this unique mineral at Tregonning Hill, near Helston, in the far west of Cornwall.

Although its use had been known in the Orient for a thousand years before, its introduction into the Western world by this Devon alchemist in 1746 triggered off what has since become one of Britain's major export industries.

Popularly known as 'Kaolin', it is so named because the early oriental deposits were extracted from the elevated ridges of granite strata, mostly in the Kiangsi province of China. Such areas are named 'Kao Ling', which in Chinese means 'High Ridge'.

Following Cookworthy's discovery, the 'Kao Ling' or high ridge which forms the long, granite backbone of our western peninsula was also found to contain areas rich in this mineral, which today impinges on almost every branch of our social and commercial life.

Great expansion

Mainly because of port facilities at Par and Fowey, the centre of the industry developed in mid-Cornwall where the early 19th century saw great expansion. Landowners exploited the new discovery as more and more consumers found countless uses for the fascinating white powder. Potters including such famous names as Spode, Minton and Wedgwood moved into the area and by 1900 there were no less than 120 different companies recovering and refining the mineral.

Gleaned from shallow pits on the windswept, mist-enshrouded moorlands of west Devon and Cornwall and started as a result of a search by a man, regarded by many as an eccentric, seeking only to produce in his small Plymouth pottery porcelain of the same fine texture as that made by the orientals, this new industry had rapidly replaced metal-mining as the county's contribution to Britain's exports.

In the early days the clay, having been washed from the kaolinised granite, was pumped, in suspended form, to settling tanks. When a sufficient depth had settled, the water was drawn off and the clay cut into blocks and taken to 'dries'. These were long, open sheds heated by coal furnaces. The dried white blocks were then either loaded directly into rail trucks or taken by horse-drawn wagons to the ports for shipment.

Modern production methods

Modern production methods still use water for the initial extraction but more powerful pumps, jets, and other sophisticated equipment now contribute to elaborate drying and refining procedures bearing little relation to the original manual routine.

Today, even after the clay has been dried, further processing is necessary to provide the grades and high qualities demanded by the various consumers.

Later refining stages now involve the use of analogue computers to allocate the correct proportions of different blended grades to produce a specialised product to comply with a particular requirement.

Throughout the refining process the clay appears in almost every form from 'slurry' (a clay and water mixture) through the moisture eliminating stages to a putty-like consistency, finally to emerge either as the familiar glistening white powder which in its most highly-refined form is so soft and smooth that it is used as a carrier for the active ingredients of medical tablets and powders, or, depending on requirement, in pelletised or lump form.

Contrary to popular belief, the potteries are not the industry's largest consumers. Paper manufacture accounts for more than three-quarters of all output whilst the remainder contributes to a vast variety of industries ranging from ceramics, rubber, paint and plastics to a host of everyday articles too numerous to itemise.

Queen's Award

This refining and processing business is backed by an extensive technical research organisation employing 200 specialists in modern computerised laboratories and large newly-built administrative offices. Approximately 7,000 people are employed by the Clay Division of the Group alone.

The rapid growth of the industry in the 20th century and the need for greater capital investment resulted in many of the main producers merging in 1919 to form the English Clays Lovering Pochin & Co. Ltd., which in turn is a member of the English China Clays Group. The merger was followed by a second expansion period and, although a few of the original companies retain their separate identity, the bulk of the business is carried on by the main group, which comprises a Clay Division, Quarry Division, Building Division and Transport and Services, employing in total some 11,000 people. Many of the smaller, less-economical pits have been closed and expansion concentrated in larger integrated units in the more remunerative areas. Today the output, running into some 2½ million tons per year, comes from about 26 pits, the largest of which produces 7,500 tons per week.

About 80% of the total output is exported to more than 60 different countries, gaining for the Group the Queen's Award to Industry (export) in 1966 and again in 1969.

Communications

Co-ordination of such a widespread organisation involving pits and quarries spread over a large area of mid-Cornwall and west Devon, isolated refineries, and various rail and port dispatch centres, must obviously call for a considerable communications network. This is handled by eight privately-owned automatic telephone exchanges connecting some 1,200 lines and several V.H.F. and U.H.F. radio circuits.

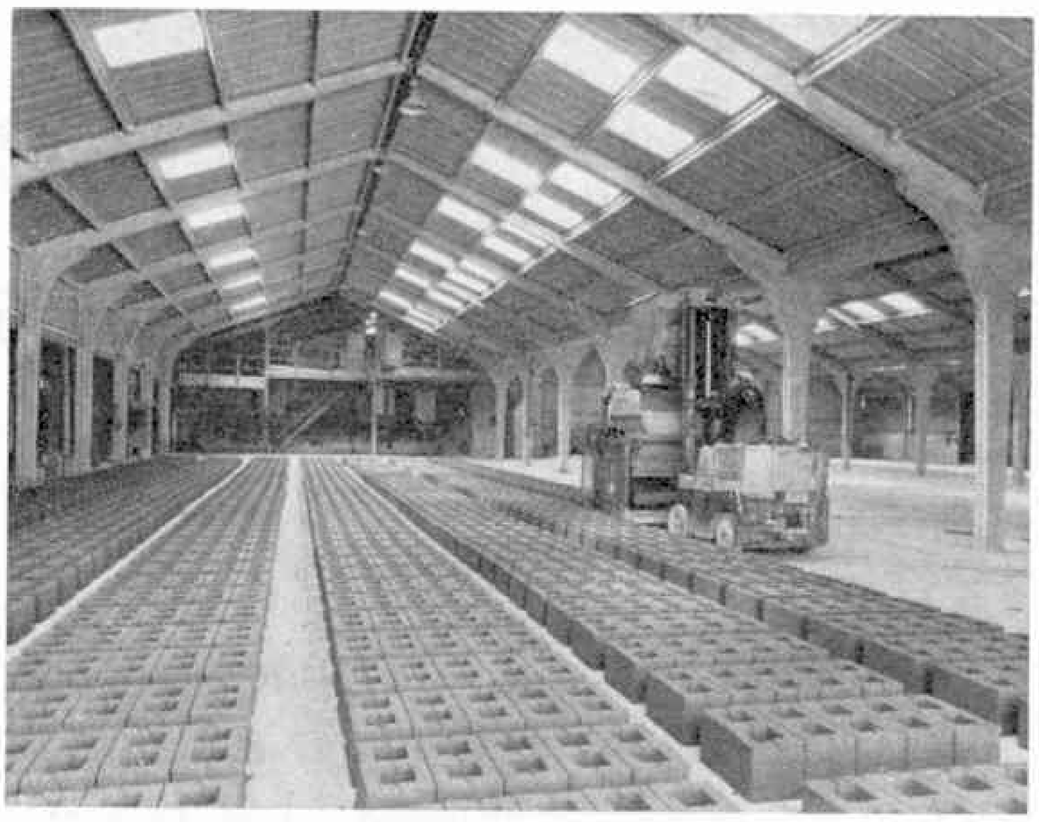
A fleet of 700 lorries, many of them carrying 25 tons, transport 90% of the clay handled from the main despatch Port of Par, in addition to which the Company has its own railway system and private motorway built on the route of the abandoned branch line which ran to Fowey. Extensive marshalling yards feed the B.R. inland system over which a fleet of special tankers convey clay in 'slurry' form direct to paper manufacturers in Britain.

The subsidiaries of the clay division participate, not only in every stage of clay production from excavating machinery to port of shipment but also cover many ancillary activities. The Heavy Transport Division, for instance, is well-versed in the complex problem of handling cargoes of varying grades, some in bulk and some in paper bags. A ship loading, say, 600 tons may have to stow as many as 20 different grades. In addition to road transport, this involves the use of various cranes and conveyors to their best advantage.

Allied Companies

Readers familiar with the summer tourist traffic on Cornwall's narrow winding roads will appreciate the difficulties involved in maintaining a continuous flow of traffic to ports. These are minimised by the creation of a 'buffer' stock available from trailers parked at the port precincts and extensive store facilities, thus enabling machinery to continue loading in the event of delays. This is important, not only from the obvious

(*continued on page 245*)



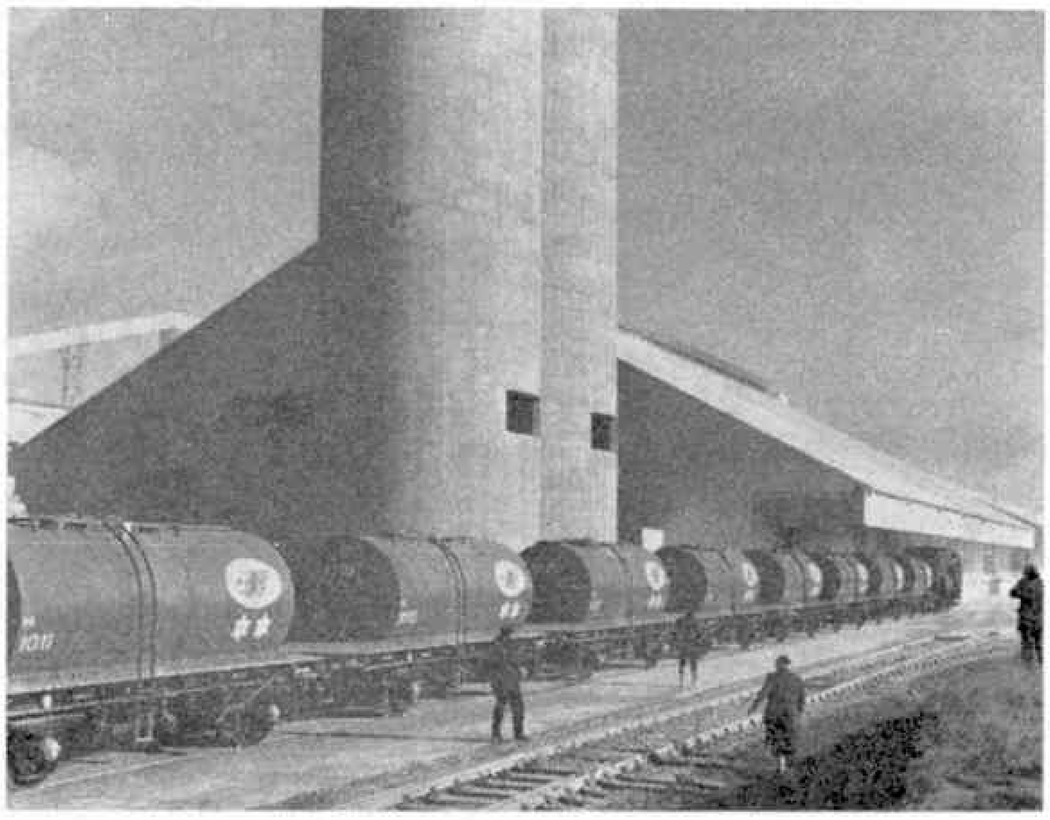
Opposite: General view of the Port of Par.

Above: Mass production of concrete blocks using quartz sand.



Above: Bulk tanker pressure loaded with powdered clay leaving storage silos.

Below: Bulk carriers taking clay slurry by rail to home consumers.



Putting Us on the Map

The work of the Ordnance Survey Department described by A. P. Major



Draughtswoman scribing the detail of a large-scale (1:2500) plan.

EVERY DAY NEW DEVELOPMENT or redevelopment schemes begin in towns, cities and the rural areas. This has the effect of making our maps frequently obsolete and so the work of our map makers is never ended. As soon as an area is surveyed and the map published, the work has to begin all over again within a short period. At the present time the Ordnance Survey staff is carrying out an exhausting survey of England which it is proposed to complete by 1980. This is a mammoth task when it is realised it will include 47,000 maps covering three hundred towns at a scale of 50 inches to the mile, 175,000 maps at 25 inches to the mile, to cover rural areas, and 10,000 maps at 6 inches to the mile to cover moorland and mountainous areas. At these scales the most minute detail will be included, with a maximum tolerated error of only one inch in twelve miles.

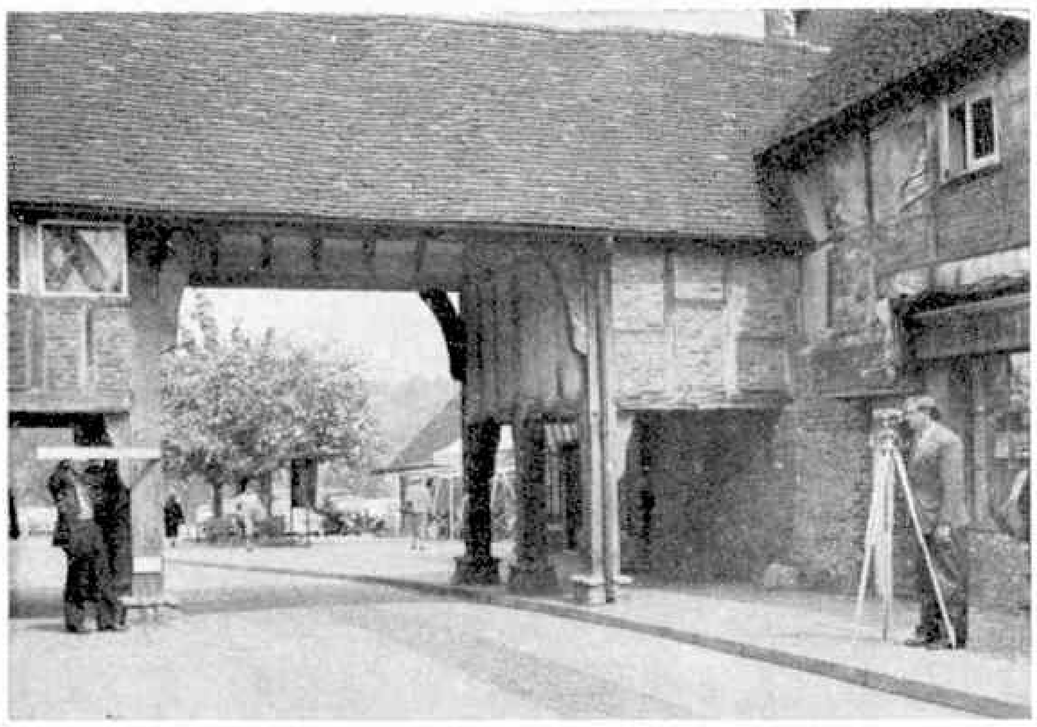
Map-making in Britain dates back to the Romans in the 1st century A.D., when they were constructing their road and communication routes in this country. The maps made by Claudius Ptolemaeus remained unchanged or improved upon for 1,200 years until in the Anglo-Saxon and later periods, such as Queen Elizabeth I's reign, other map makers produced maps of England and its counties. Although containing a wealth of detail of historical interest to us, some of these are extremely inaccurate and one wonders what happened to the travellers who tried to use them. At best they must have got completely lost !

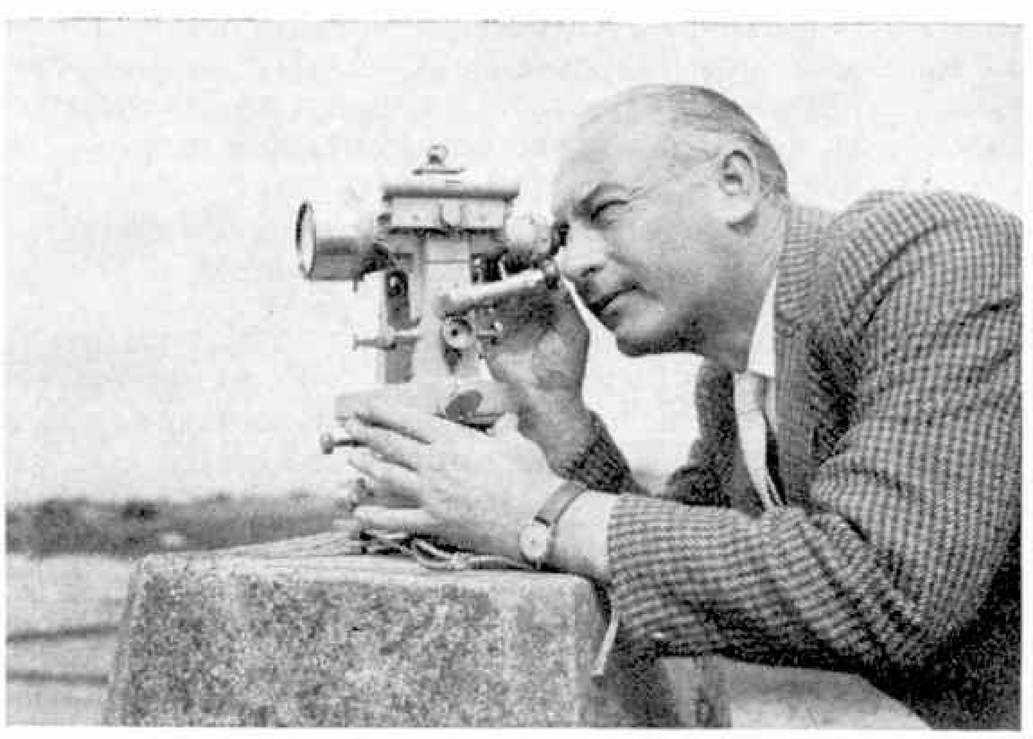
The first serious map-making of Britain began in 1747, after the uprising of the clans under Bonnie Prince Charlie made the English Army realise that to control the Scottish Highlands effectively accurate maps of the area were essential. The Army, under the command of General William Roy, prepared these, at a scale of 1,000 yards to the inch, the work continuing until 1755. These original field sheets are preserved in the British Museum. In 1784 General Roy measured the first base, a necessity for accurate mapping, on Hounslow Heath, the terminals of the base being marked by buried cannons.

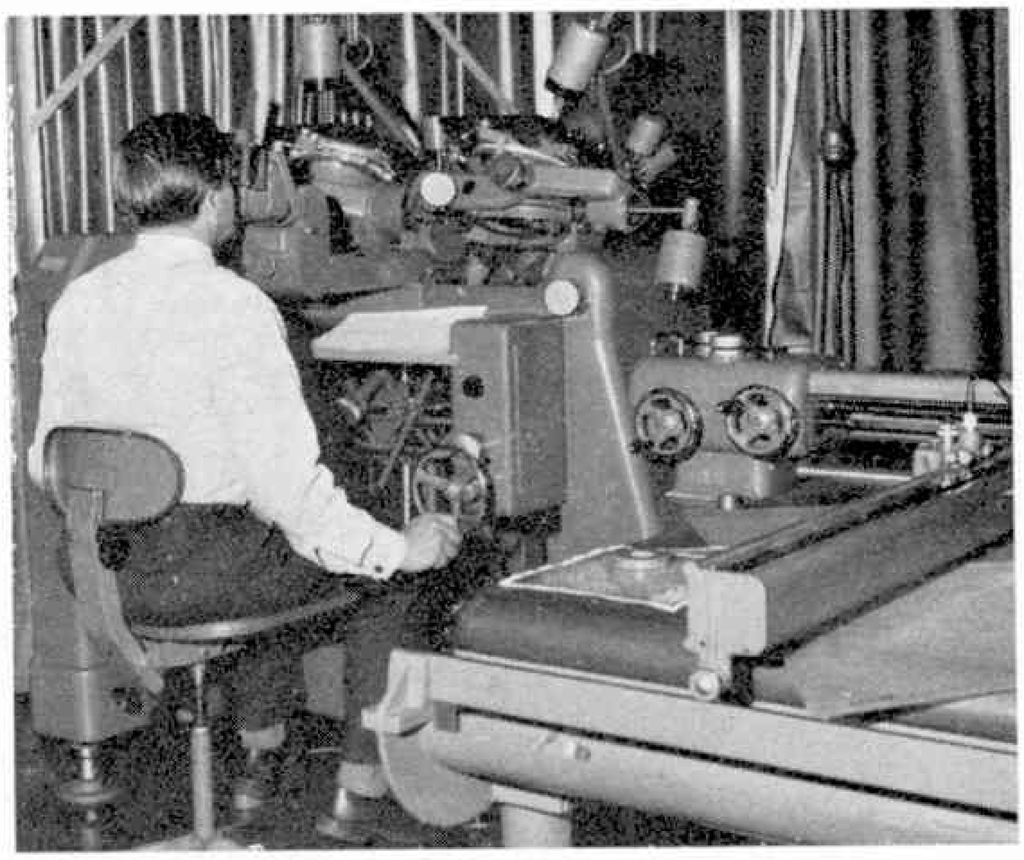
The threat of another war, with Napoleon, jerked the Government of the day into deciding to map the whole of Britain, on a scale of one inch to the mile, for defence purposes. In 1791 the National Survey was founded by the Honourable Board of Ordnance, with its offices in the Tower of London, but the actual surveying did not begin until 1795. Later the name was changed to the Ordnance Survey which it retains. The area in most imminent danger of invasion was Kent, and so the first O.S. map of this county appeared in 1801, followed by that of Essex in 1805. By 1840 the whole of England and Wales south of Preston had been mapped. The first one-inch map of Scotland was published in 1843 and by 1892 the whole of Britain was covered.

Before and since then other types of map were prepared. The Government in 1791 ordered a trigonometrical survey to be carried out and by 1809 the

Below, left: A tacheometric survey in progress, showing the advantage of optical measurement over surface measurement. The staff is usually set up on a tripod. Right: A Cooke, Troughton & Simms five-inch geodetic theodolite in use, observing from an O.S. triangulation pillar.







Surveying from air photographs by means of a Thompson-Watt stereo plotting machine.

triangulation covered England and Wales, and the whole of Britain and Ireland by 1853. A six inches to the mile map of Ireland in 1845 proved successful for valuation purposes and so similar maps were prepared for England and Wales by 1896. But it was realised even before this that a larger scale would be needed and so in 1853 a map making survey with a scale of 1/2,500 (about 25 inches to the mile) was begun, and completed in 1890. In 1891 the first revision of the Survey maps began and has been undertaken periodically since then. The expanding railway routes of the last century had to be added. Hill-hachuring was replaced by contours. From 1893 colour for various items was used, followed by hill-shading in 1931.

Previous to this one-inch maps had been based on engraved copper plates. At each revision these plates were duplicated and corrected and the maps were produced by transferring the engraved outline to stone and zinc. The new maps after 1931 were drawn for reproduction by a photographic process known as helio-zincography.

During the First World War the O.S. department produced maps solely for military purposes, which so delayed the department's normal work that between the two World Wars the O.S. was unable to keep pace with recording new development, housing schemes, etc. In 1935 a Government committee investigated and one of their recommendations was the introduction of a National Grid system and its superimposition on plans and maps. The 1939 war held up this scheme, when maps for war purposes were again the O. Survey's main concern, but in peacetime this and other recommendations were implemented for map preparation.

All modern Ordnance Survey maps carry the National Grid. This is simply a series of squares with sides respectively parallel and at right-angles to the straight line that represents the central meridian of Ordnance Survey mapping. The sides of the grid squares are multiples of a metre and with their assistance every point in Britain acquires a unique map reference comprising its rectangular co-ordinates in metres measured positively eastwards and northwards from an arbitrary origin slightly south-west of the Scilly Isles. The National Grid reference of a point remains the same whatever the scale of the map in use, but the precision to which it can be given depends on the scale. The uniqueness of each reference makes the system of great value to all map users and in particular to those engaged in statistical recording, public and professional administration and business.

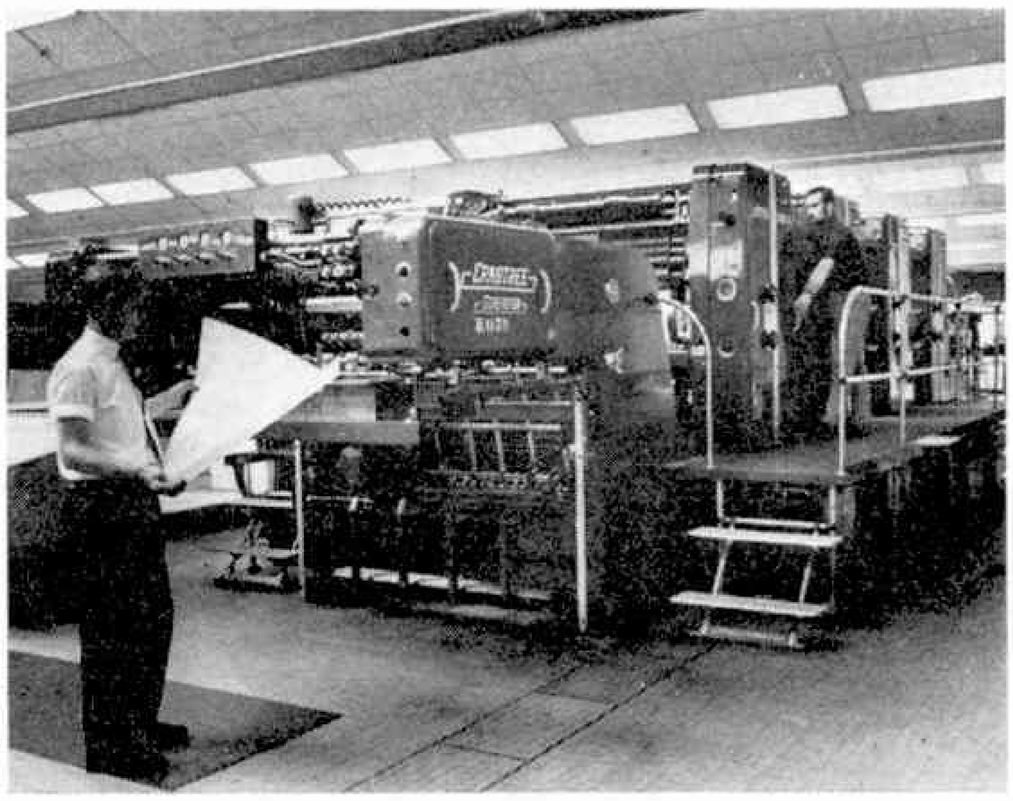
The present task of the Ordnance Survey is officially to survey and map Britain, including geodetic surveys and their associated scientific work, topographical surveys and the production of maps at appropriate scales from the surveys. The work at present in progress will be kept up to date by a system of continuous revision that ensures changes on the ground are surveyed soon after they take place. The Survey at their Southampton headquarters in fact welcomes information from the public concerning these changes or errors that may occur in published maps. Suggestions for improving its maps are also carefully considered. Regular meetings are held with representatives of interested or affected organisations, planners, engineers, farmers, local authorities, forestry, motorists, tourists, naturalists, etc., who use the maps.

Today the Ordnance Survey consists of three sections—the Field Survey Directorate, the Map Publication Directorate and the Directorate of Establishment and Finance.

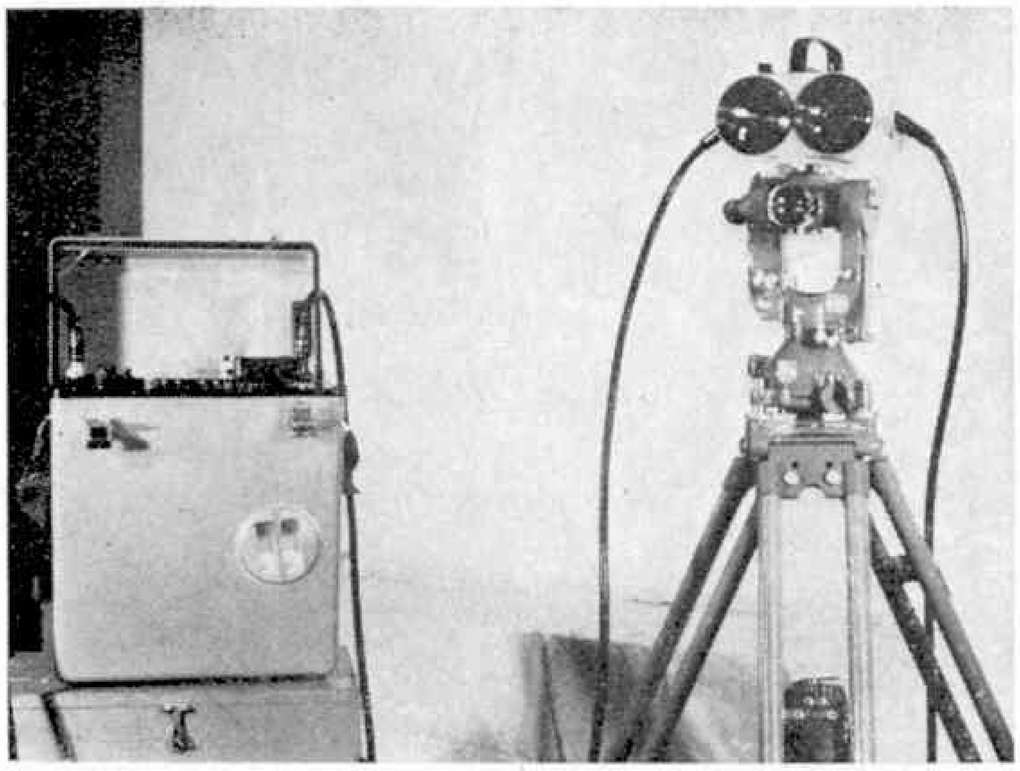
The Field Survey Directorate also includes an archaeology department which identifies, surveys and records all antiquities shown on O.S. maps and also prepares special archaeological and historical maps.

Modern inventions now make the work of the O.S. staff much easier and simpler. The use of helicopters to transport surveyors and their instruments to mountain-top triangulation stations replaces day or days-long treks in rough country hauling heavy survey equipment. Base measurement, once a laborious task, is done by using instruments such as the Geodimeter and Tellurometer, doing a job in hours that in the past took weeks. These measure distances to an inch or two by timing to a thousand-millionth part of a second the journey of a radio or light signal to a distant station and back.

The Survey hires aircraft to take its own air photographs as a part of its surveying operations, particularly for new surveys. Details and contour are plotted with stereo-plotting machines, although a large proportion of the work still has to be done by surveyors on the ground. A part of this is checking detail on the



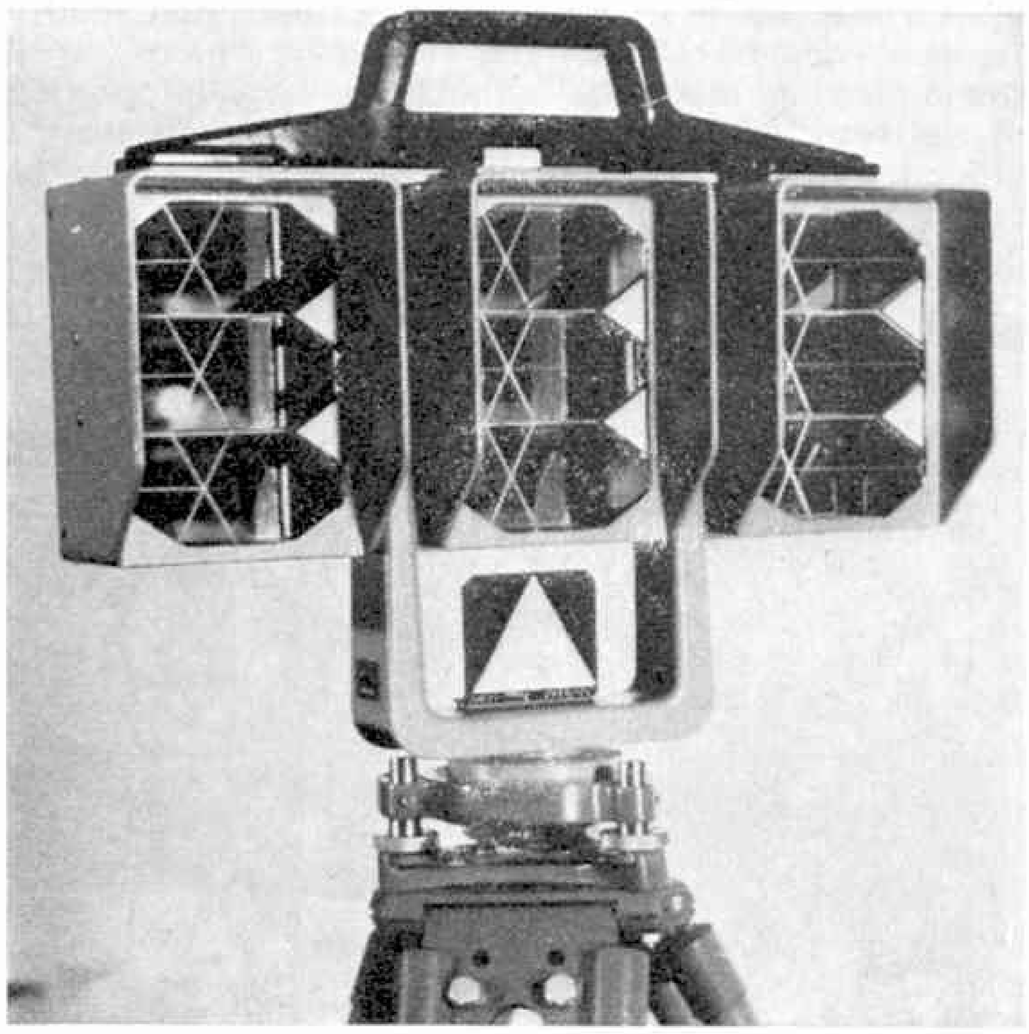
Map-printing on a Crabtree Sovereign four colour printing machine.



The Distomat is an instrument for electromagnetic distance measurement. The optical measuring head (shown left with power pack and control box) is used in conjunction with a range of reflectors, one of which is show in the photo below.

photographs and adding in what cannot be seen from the air, such as any building hidden under trees, etc., the work also including adding the administrative boundaries and collection of house names and numbers. This at times means setting up equipment in someone's garden, with theodolites, steel rules, red and green poles, etc., and the Survey men are immediately thought to be council snoopers, but when they tactfully explain they are only putting the garden premises "on the map" usually they are allowed to continue without trouble.

Whether working on a hillside or in a village street they begin by measuring very carefully the distance between two points. They then take a bearing on a third point from each of these first two points and by measuring the angles of the bearings discover the relative position of the third point. From this they then pick a fourth point and so on until the whole area they are surveying is covered. The three points in each triangle have to be what is known as mutually visible, which meant that most of the triangulation points of the earlier maps were either church spires, mountain tops or prominent objects. Some of the most remote were in Scotland and to do this work the Survey men often lived on the summits of the Cairngorms for weeks.



Nowadays walkie-talkie radio apparatus is used to keep in contact with working parties on distant peaks or hillsides.

Several types of Survey triangulation station "marks" are in use. The triangulation pillar consists of a concrete stone pillar about four feet high, tapering from two feet square at the base to fourteen inches square at the top. A brass plate in the top is for the feet of a theodolite. A "bench mark" of the flush bracket type is fixed into one side of most of these pillars. A "surface mark" is normally a dome-headed bolt or rivet fixed into outcropping rock or a concrete block at ground level. A "buried station mark" is marked by a brass bolt or rod set in a concrete block about two feet below ground level. Other "marks" are placed upon roofs or may be marked on the ground with rivets, cross cuts on manhole covers or with rivets in concrete blocks, the corners of buildings, walls, etc. "Bench marks" are marks whose height above Mean Sea Level has been determined by spirit levelling. The most frequent type is a horizontal line cut in masonry or brick work, distinguished by the Government broad arrow cut below them. The altitude of this type of "mark" is always to the middle of the horizontal line. Such marks are to be found at intervals of about four hundred yards along most roads and some more regularly in built-up areas. All these examples are marked on the Survey maps with initials of the type of mark to indicate its position.

When all this work on the land and in the air is completed by the Survey's surveyors it is vital that the information should be transcribed in the preparation of the map as accurately as possible. To do this the Survey's Map Publication Directorate staff, comprising 1,500 draughtsmen and 400 printing craftsmen, are employed at Southampton. The traditional drawing method has been mostly replaced by "scribing". For "scribing" the draughtsman uses a steel or sapphire point to cut the line work upon a coated glass or plastic sheet, which bears a photographic image of the field sheet to guide him. The names for places and objects are no longer hand-drawn, but are photo-composed on stripping film and then stuck on to a photo-positive of the outline. Other symbols, vegetation, etc., are also applied in this way using cut-outs from sheets of standard symbols. Non-distorting materials, either glass, metal or plastic, are used in all stages of production. Automatic mechanical or electronic processes are used during the stages of printing.

A future development will be the introduction of the metric system which the Survey is to adopt on its large scale maps. Contours and spot heights will be given in metres and the areas of fields in hectares. But for many years the Survey has used a metric grid on its maps; the sizes of the map sheets themselves have been based on this grid and correspond to metric dimensions on the ground. Most of the map series have scales already in decimal form, the only exceptions being the one-inch and six-inch maps. The first Ordnance Survey maps based completely on metric measurements were issued in the autumn, 1969, but the change-over is likely to be gradual and limited to the large scale maps, including the six-inch to the mile series. This is not surprising when it is realised the immense task that faces the Ordnance Survey, with

(*Continued on page 245*)



Southampton Docks from the air. In foreground left is the Queen Elizabeth II Terminal with the Ocean Terminal and Ocean Dock behind. At centre is the Empress Dock, and, far right, the Princess Alexandra Dock. At far left of picture are liners berthed at the Western Docks.

Gateway to Britain

The premier ocean passenger port, Southampton, may justly be called that, says W. H. Owens

NONE OF OUR MAJOR SEAPORTS has a fairer claim to this title than Southampton. Six or seven out of every ten passengers who enter or leave Britain by ocean-going liner pass through the port. The big luxury-class ships of the world, and vessels of almost every other description, provide an unrivalled maritime spectacle up and down Southampton Water, the six-mile channel between the docks and the open sea.

Southampton has long been famous as the home port of the Atlantic "Queens". The latest of these Cunard liners, the "Queen Elizabeth II", berths at her own modern passenger and cargo terminal built on the Test Quays below the Ocean Dock. Other great passenger liners docking regularly at the port include the P. & O.'s "Canberra" and "Oriana", the Union Castle Line's "Transvaal Castle" and "Windsor Castle", and among foreign ships, the "France" and the "United States", the pride of their respective nations.

While maintaining its position as the premier ocean passenger port, however, in recent years Southampton has made rapid advances as a leading cargo centre as well. It handles freight of all kinds bound to and from many parts of the world. The drive-through ferryship terminal, which opened in 1964, now has a large share of the fast increasing freight-on-wheels and passenger/car traffic between England and the Continent.

Most significant for Southampton's future prosperity is its recent emergence as a major container ship port, at present handling ocean container traffic across the Atlantic. In spite of the strong rival bids by London and Liverpool, it has been decided that Southampton will handle the bulk of containerised trade to and from the Far East when this begins about the end of 1971. Two huge new container berths, to be built in the port at a cost of around £11 million, will handle the new traffic.

The geographical and natural advantages of Southampton, which have boosted its trade to record new levels since the second World War, were reasons for its earlier development into a great seaport. It is centrally situated along the English Channel coast at the head of a deep, broad estuary which is one of the world's finest natural harbours. Added to this is the unique advantage of double tides which gives four hours of high water each day. With a moderate tidal range of only thirteen feet, closed docks are unnecessary. The approach channel is 35 feet deep and the



Exports on wheels. A semi-trailer being driven aboard Normandy Ferries "Dragon" at Southampton. A double lane ramp-bridge allows units up to 22 ft. wide to go aboard. Loads up to 21 ft. high can be carried on the open deck.

principle berthing quays are dredged to 40 feet at low water. So the largest ocean-going ships can arrive or sail at any state of the tide.

Southampton was already a port of consequence in the Middle Ages, when wines were imported there from France and English wool was exported to the Continent. Many famous voyages of exploration and overseas settlement began from the old town quay, the most historic of which was the sailing of the Pilgrim Fathers in August, 1620, recorded on the "Mayflower" Memorial under the town walls.

Development of the modern port began in the eighteen-thirties when the Southampton Dock Company was formed. Over the next half century the

One of the major passenger liners regularly using Southampton is the 45,000 ton "Canberra."

group of Eastern Docks came into being. Then, in 1892, the port undertaking was sold to the old London and South Western Railway, later merged into the Southern Railway network. After the nationalisation of the railways Southampton Docks were taken over by the British Transport Commission. Today they are managed and operated by the British Transport Docks Board, formed under the 1962 Transport Act.

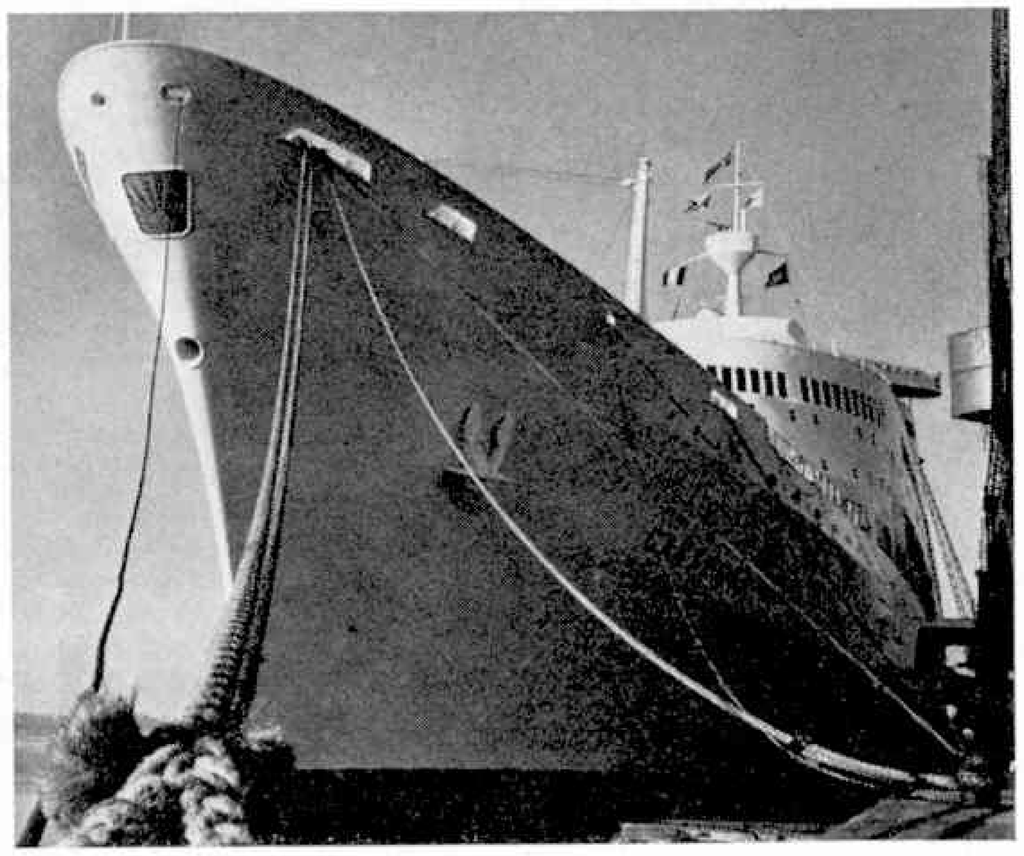
Between the world wars, under Southern Railway management, the port was expanded on a large scale with the completion, in 1934, of the Western Docks. This brought into use an additional 1½ miles of deep-water quay with nine berths capable of handling anything from coastal vessels to large ocean-going liners.



At the far end is the King George V Dry Dock—the largest dry dock in the world—which is 1,200 feet in length and can accommodate a ship of 100,000 tons.

A recent extension beyond the Western Docks and King George V Dry Dock is Southampton's most ambitious project yet, namely, the new multi-million pound Container Terminal. The deep-water berth with 1,000 feet of quay and a paved working and stacking area of 20 acres, completed early in 1969, is being used by internationally well-known container-ship operators as their southern British container terminal. Regular container services operate from here to ports in North America. As trade and traffic grows, up to 3,400 feet of additional quays and berths will be constructed to complete the first of a massive three-phase development programme.

The handling of standard 20 feet, 30 feet and 40 feet loaded containers between ship and shore requires special equipment. At Southampton the job is done



fast by two giant 30-ton Paceco-Vickers 'Portainer' cranes, each of which can load or discharge 40 loaded containers per hour. The boom of each crane projects over the ship at a height of 80 feet above quay level, giving an outreach of 115 feet and a backreach of 30 feet, and the rate of hoist is 100 feet per minute at full load. On the quay working area a fleet of side-loaders, straddle carriers and high capacity fork-lift trucks are used for the movement and stacking of containers.

Close to the container berth, British Rail have established an up-to-date terminal for their fast cross-country freightliner service—one of the world's most modern land container transport systems. From this Southampton terminal services operate to London, Birmingham, Manchester and other big cities up and down the country. Improved road communications in and out of the port are helping to speed the flow of road-borne containers to and from London, the North of England and Scotland.

In the Eastern Docks one of the most important developments has been the provision of facilities for

Containers for export to North America being handled by the two Paceco-Vickers Portainer cranes at Southampton's ocean container terminal.



Recent aerial view of the Princess Alexandra Dock, base of the port's booming cross-Channel ferry business. Vessels at the four berths are (left to right): Swedish Lloyd's *Hispania*, Normandy Ferries *Dragon*, Thoresen's *Viking IV* (all cargo) and *Viking III*. Picture also shows extensive marshalling areas for cars and commercial vehicles.

the drive-on/drive-off ferry services between Southampton and Cherbourg, Le Havre, Bilbao, Lisbon and Casablanca. The main terminal for these services is the Princess Alexandra Dock, created out of the former Outer Dock at a cost of over £2½ million. The entrance to the old dock was widened from 150 to 325 feet and the basin dredged to a minimum depth of 20½ feet, while three link-spans were constructed as driveways between the shore and ships. The former Inner Dock, which adjoined, was filled in to provide reception areas for cars and lorries.

The main cargo traffics through Southampton include fruit from South Africa, the West Indies and the Channel Isles; South African wool and wines, and wines from France and Spain; motor vehicles (exports and imports); grain, which is handled at the huge Solent Flour Mills of Joseph Rank Limited; and refrigerated cargo, handled at the International Cold Store in the Western Docks. This modern four-storey building, which provides refrigerated capacity for 4,500 tons of meat and produce, is able to receive or deliver to and from ship, rail or road transport simultaneously when required.

Southampton's most important addition to its ocean passenger and cargo facilities is the Queen Elizabeth II Terminal, completed in 1966 at a cost of nearly £1,400,000 and opened by Her Majesty the Queen. This terminal embodies the latest techniques in transit shed construction and cargo/passenger handling. On the ground floor is a huge clear-span area, 928 feet long and 165 feet wide, for rapid freight moving operations. Escalators and stairways connect it to the well appointed passenger hall on the first floor. As in the case of the Ocean Terminal (opened in 1950), which extends practically the length of one side of the Ocean Dock, liner passengers pass between ship and shore at this first floor level through telescopic gangways covered in to give protection against the weather.

PUTTING US ON THE MAP (*continued from page 243*)

several hundred thousand different maps to be converted to metric form and reprinted, a job which cannot be done overnight.

In addition to these how-to-find-your-way maps the Survey in recent years has expanded in producing factual maps, such as historical and archaeological maps—Roman Britain, Hadrian's Wall, monastic Britain, etc., geological maps, and limestone, land utilisation, population density, rainfall, etc., administrative maps, and also the popular tourist maps, giving a wealth of information about features in the areas covered, in some cases listing worthwhile sights the motorist can see from the main road without getting out of his car !

The author acknowledges with sincere thanks the generous assistance of the Ordnance Survey, Southampton, in the preparation of part of this article and also for supplying photographs used as illustrations.

CORNISH CHINA CLAY (*continued from page 239*)

economic aspect but also to facilitate maintenance of carefully pre-planned arrival and departure programmes arranged to synchronise with tides and other natural factors.

Other sections of the E.C.C. Group of companies are engaged in the manufacture of all types of pre-cast concrete buildings and the materials necessary for every type of civil engineering works from roadstone, railway ballast and concrete aggregates to bricks, building blocks, pipes and paving stones.

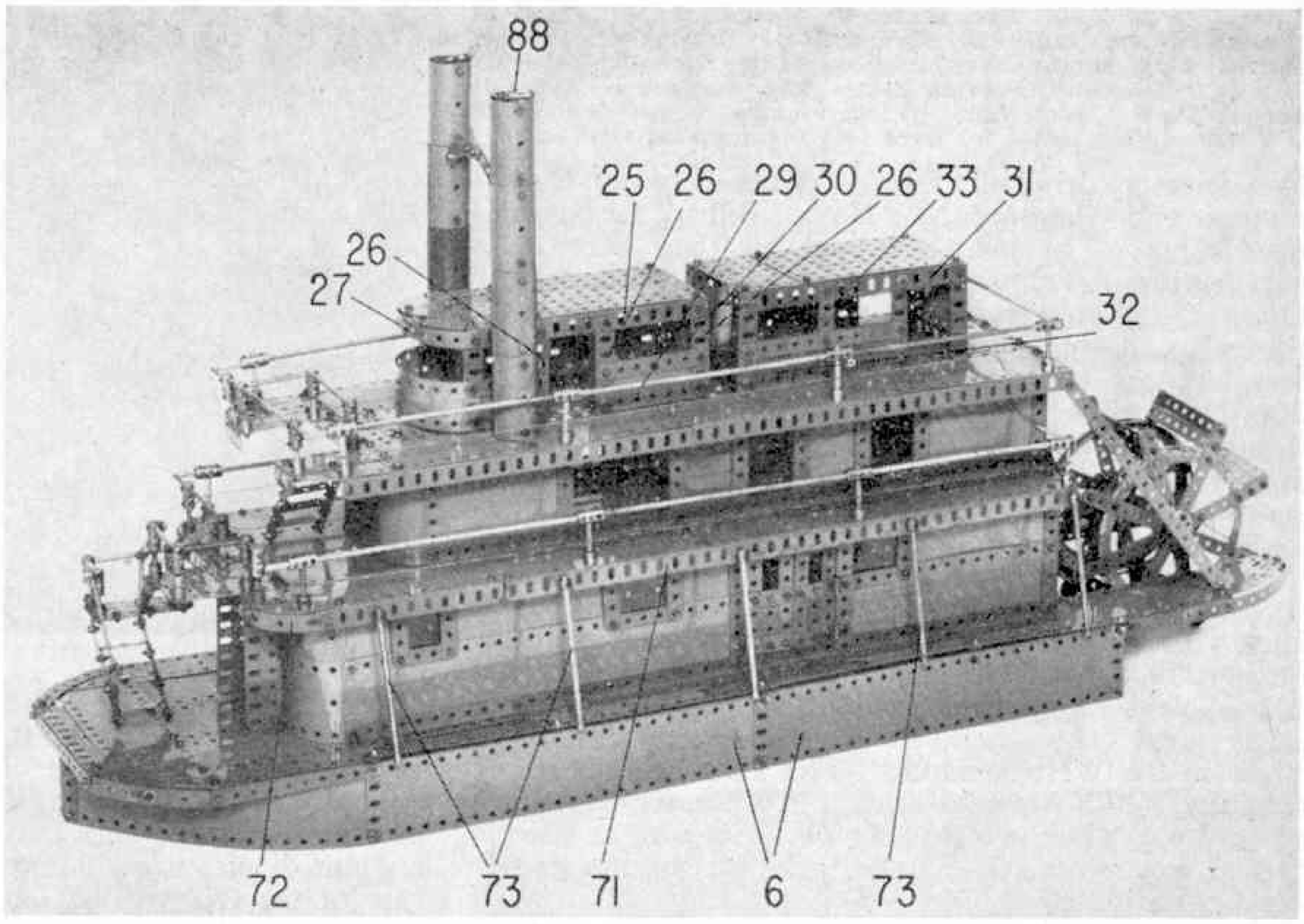
One of the Building Division's current contracts involves the provision of homes for about 8,000 people for the Runcorn Development Corporation at a cost of over £8 million. This is one of the largest single housing contracts ever to be awarded and only one of the many large-scale commercial projects which have sprouted from the fertile seeds unconsciously sown by that aged eccentric who explored the barren Cornish hills over 200 years ago. Incidentally, his pottery business failed and ceased production in 1772; Cookworthy died in 1778.

MODEL-BUILDERS (*continued from page 219*)

David's age, it must be heralded as something of a miniature masterpiece, well worthy of inclusion here.

Construction, needless to say, is easy. Two runners are each provided by a 5½ in. Strip 1, extended by a 2½ in. Stepped Curved Strip, the finished units being attached to the side flanges of a 5½ × 2½ in. Flanged Plate 2 by a 2½ in. Strip 3 and a Fishplate. Bolted to the forward flange of the Plate is a 5½ × 2½ in. Flexible Plate 4 which is curved backwards to form the main body fairing, the upper corners being connected by Angle Brackets to two further 2½ in. Stepped Curved Strips 5, bolted one to each side flange of the Plate. The back of the model is then provided by two 2½ in. Strips, curved to shape and connected by a 2½ × 2½ in. Plastic Plate 6, all secured to the top of the Flanged Plate. A ½ in. Pulley without boss 7 is bolted to the centre of Flexible Plate 4, a short length of Cord being passed round this Pulley and secured to the forward flange of Plate 2 to give the impression of a "ridged" body, then, last of all, a windscreen is quite simply supplied by a 2½ × 1½ in. Transparent Plastic Plate attached to Flexible Plate 4 by an Angle Bracket. The result—a highly appealing model !

STEAM-BOAT BILL



Spanner describes an advanced model illustrating a famous period of American history

THANKS TO AN ENDLESS STREAM OF BOOKS, films and magazines we are all familiar with the wild days of American history—the war whoops of Indians mixed with the gunfire of Cowboys and Cavalry Patrols, the vast herds of buffalo and longhorn cattle, the slow-moving waggon trains of brave settlers pushing adventurously westward. We are especially familiar with the most publicised forms of travel in those pioneering days—the horse, the covered waggon, the stagecoach and the frontier railroads—but there is still another form of transport which does not receive quite so much publicity as all these, and yet which played a tremendously important role in American transport history.

I speak of the Riverboats—those unique craft, looking for all the world like large floating hotels or barns, which plied the thousands of miles of navigable waters found in rivers such as the Mississippi, Missouri and Ohio. Necessarily shallow in draft because of the frequent shallows present in the rivers they worked, these utterly captivating boats were probably first to really open up the interior of what was then a sparsely-populated country, not only carrying settlers hundreds of miles inland, with all their goods and possessions, but also supplying and generally servicing the communities, towns and cities the settlers founded, over a period lasting many years !

Perhaps significantly, the Riverboats of the type in question could never be compared with river craft of today. Manufactured almost entirely from wood at a time when steam traction was in its infancy, the typical Riverboat was powered by a rather crude, wood-fired steam engine and propelled by a huge stern-mounted paddle wheel. There was always a slight danger of the engine's boiler blowing up and even greater danger of the wooden superstructure of the boat being set alight by the clouds of sparks which frequently billowed from the engine's smokestacks, although the latter danger was minimised by building the smokestacks as long as possible. Taking all this into account, however, and overlooking the fact that the top-heavy construction of the boat made the possibility of capsizing an added danger, the old Riverboats did sterling work and won a well-deserved place in the affection of Americans everywhere.

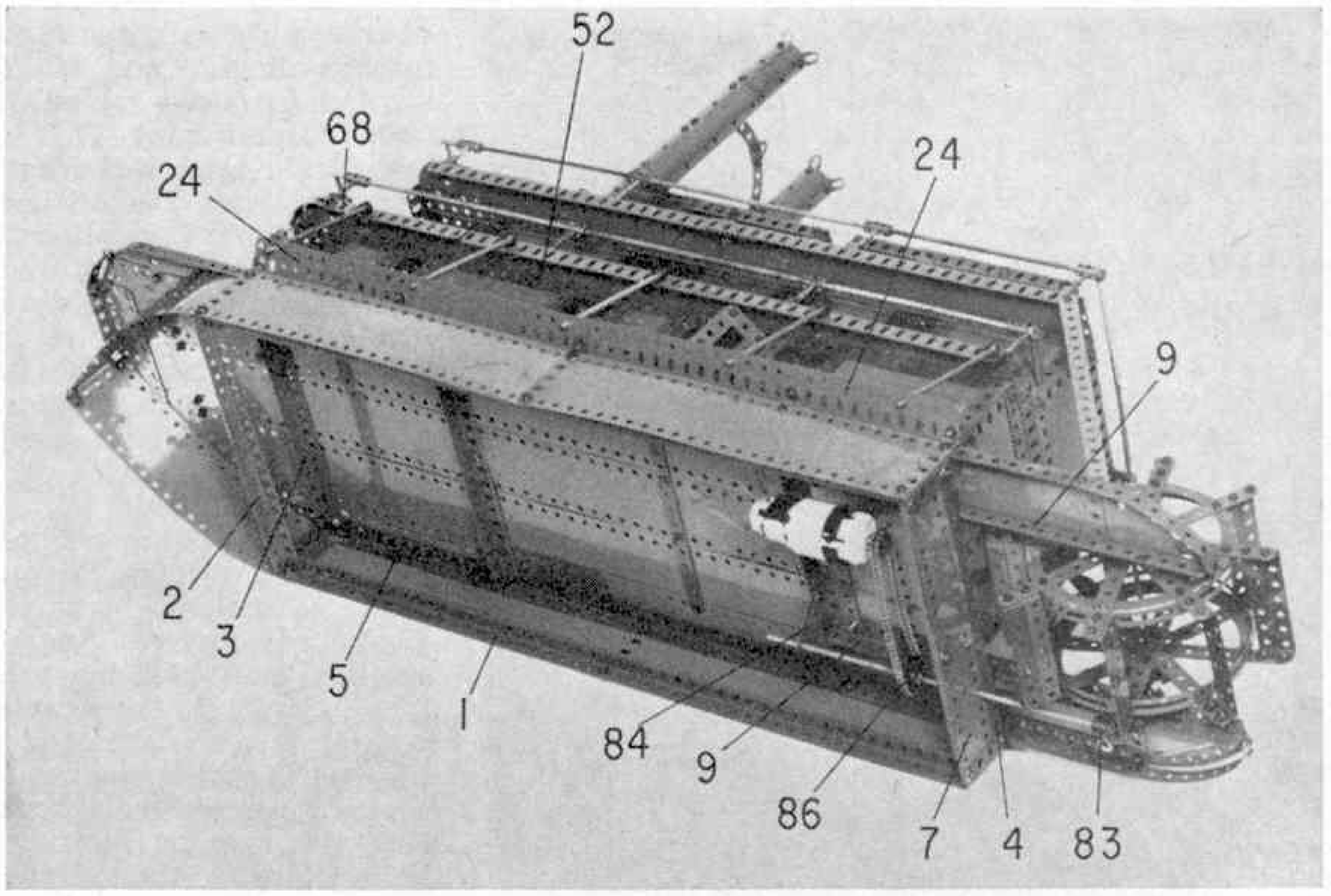
All this now brings us to the Meccano model featured here. Needless to say, this is based on a typical Riverboat of the period and it does, in my opinion, capture all the charm of the subject. It will not float, of course, but it reproduces the general lines of the prototype and the paddlewheel revolves, powered by a Motor with Gearbox carried in the hull. Although large, it is not particularly difficult to build and, when finished, it makes a superb display model.

Hull

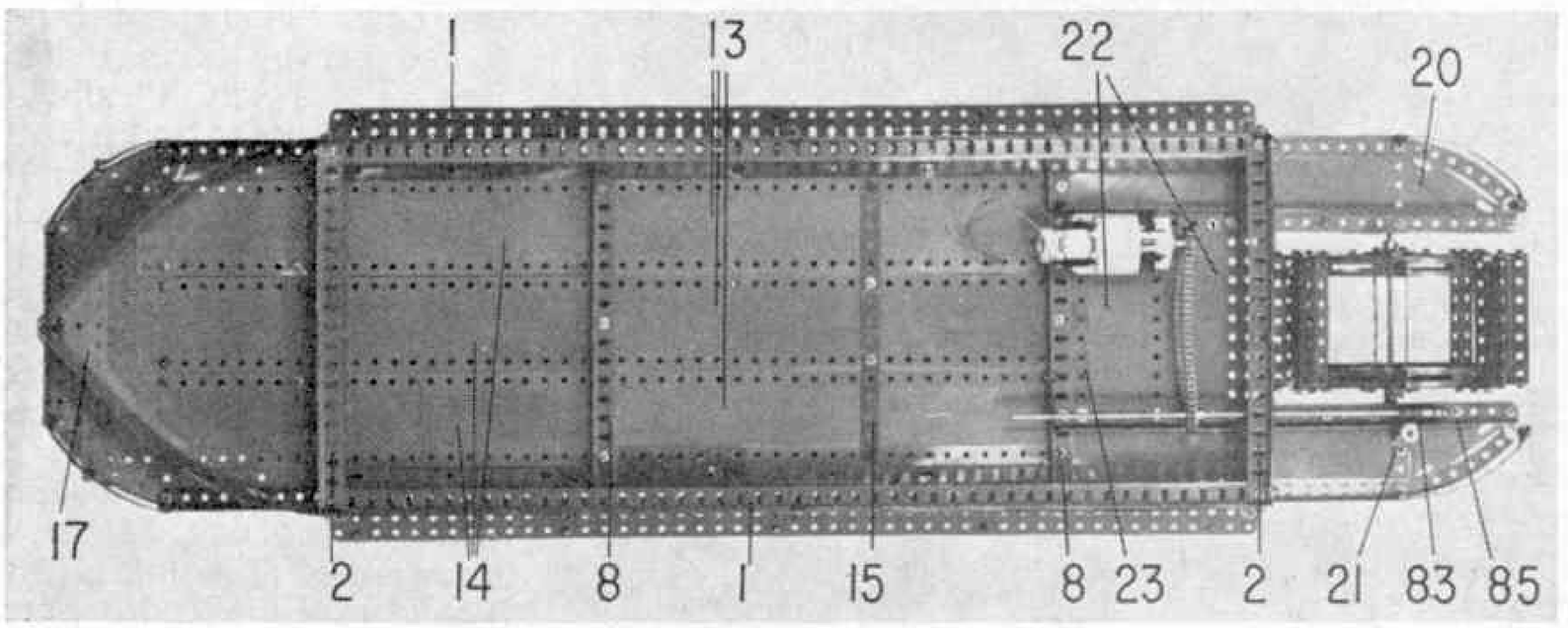
Beginning construction, like any true boat-builder, with the hull, a rectangular framework is built up from two 24½ in. Angle Girders 1 connected at the ends by two 9½ in. Angle Girders 2. Attached to the corners of the framework are four 2½ in. Angle Girders, the two Girders at one end being connected through their upper end holes by a 9½ in. Angle Girder 3 and the two Girders at the other end being connected through their second holes by another 9½ in. Angle Girder 4. The upper ends of the 2½ in. Girders are then connected longitudinally by two 33 in. compound angle girders 5, each built up from a 24½ in. Girder extended by a 9½ in. Girder. Note that each compound girder projects nine holes beyond Girder 3, but extends only eight holes beyond Girder 4.

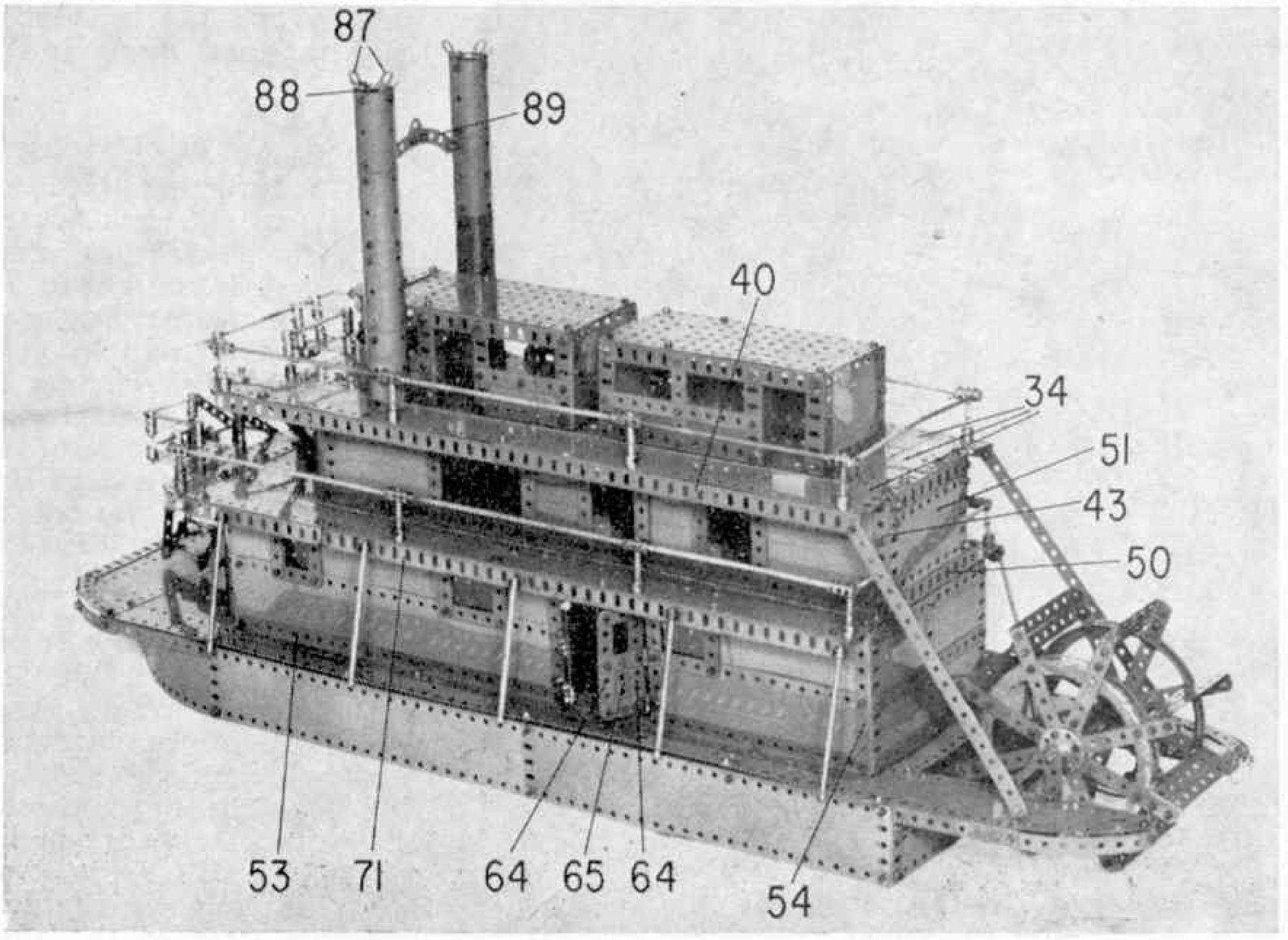
Each side of the resulting girder framework is now enclosed by two 12 × 2½ in. Strip Plates 6, these Plates being extended forward by a 9½ × 2½ in. Strip Plate. The latter Plates at each side are curved round and connected together by Angle Brackets to form the bow. At the rear, the framework is enclosed by two 5½ × 1½ in. Flexible Plates 7 overlapped three holes.

Opposite: Steamboat Bill —an advanced Meccano model based on a Mississippi Riverboat from a romantic period of American history.

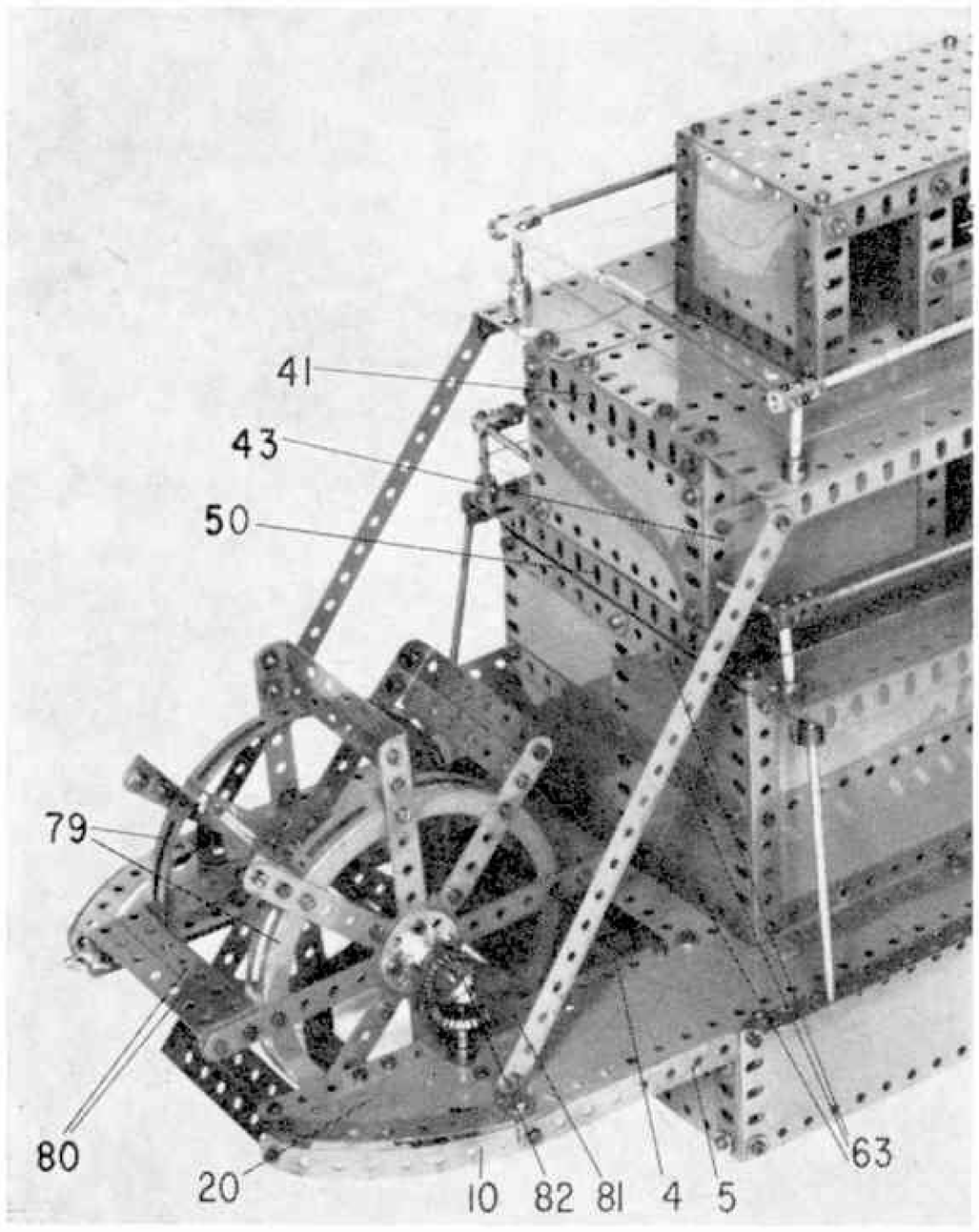


Two underside views of the Steamboat showing the Girder framework supporting the hull.



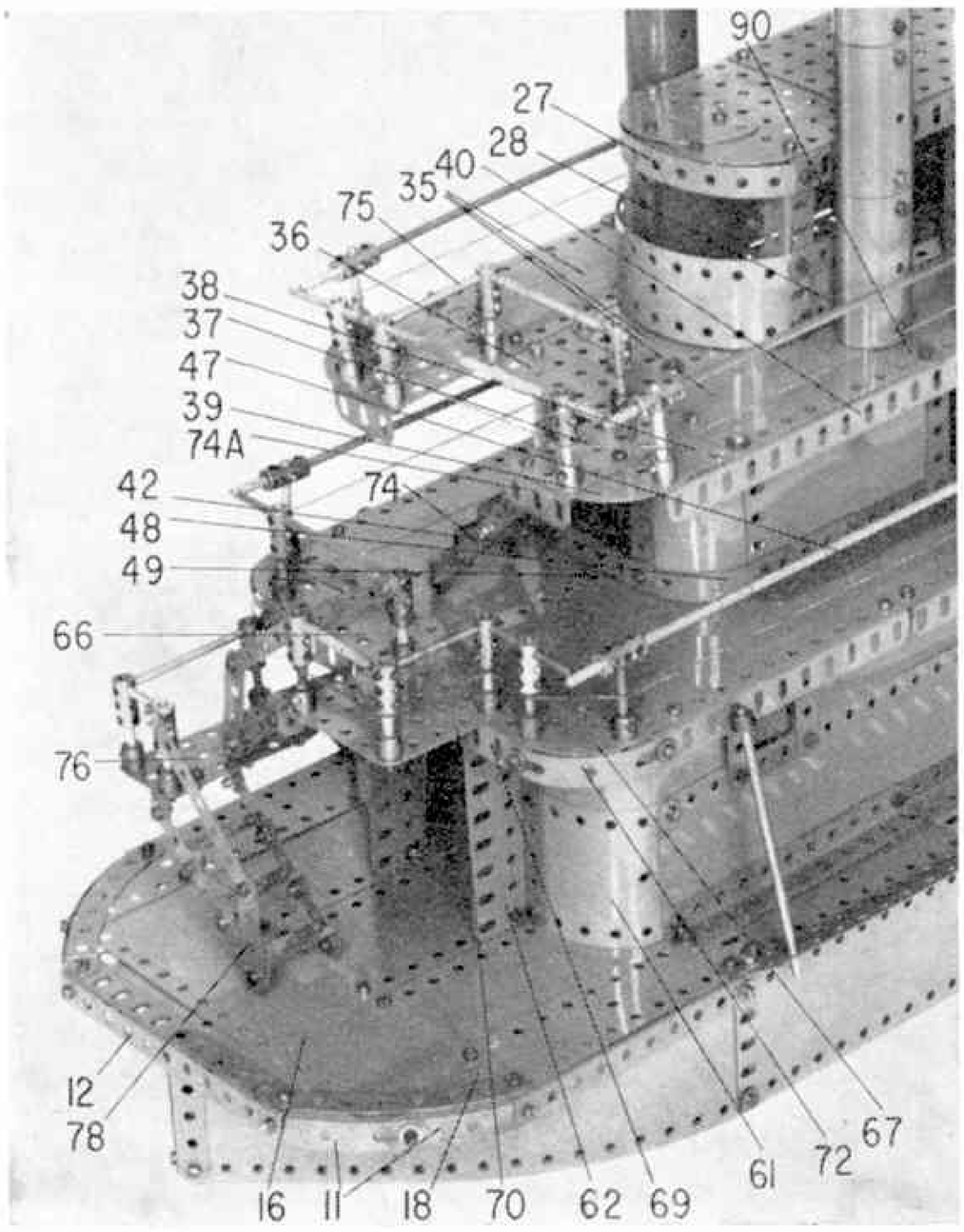


Looking at the size of the paddle wheel in relation to the whole model, it is easy to understand how the real Steamboats managed to plough their way up and down the rivers they worked for so long.



Above: A close-up view of the paddle wheel, which realistically revolves, driven by a Motor with Gearbox mounted in the hull.

Below: Construction of the companionways and saloon doorways is clear from this close-up view of the forward section of the model.



Compound girders 5 are now connected together through their 24 and 48 holes, counting from the forward end, by two $9\frac{1}{2}$ in. Angle Girders 8, two longitudinally-positioned $12\frac{1}{2}$ in. Angle Girders 9 being bolted to rearmost Girder 8 through their fifth holes from each end. These latter Girders are also secured to Girders 4 by $\frac{3}{4}$ in. Bolts, while their rear ends are connected to the rear ends of respective compound girders 5 by a shaped $4\frac{1}{2}$ in. Strip 10, attached to an Angle Bracket which is, in turn, attached to Girder 9 by a Fishplate. The front end of the each compound girder 5 is extended by two Formed Slotted Strips 11, partially straightened, the ends of the Formed Slotted Strips at each side being joined by a $5\frac{1}{2}$ in. Angle Girder 12.

The deck plating can now be added, using suitable Flexible Plates. On the model illustrated, the greatest area was enclosed by three $12\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plates 13 bolted between Angle Girders 8, another three similar Plates 14 being bolted between forward Girder 8 and Girder 3, these projecting ten holes past Girder 3. Bolted to the undersides of Plates 13 is a $7\frac{1}{2}$ in. Strip 15, which secures the Plates together, while Plates 14 are extended forward by a $7\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate 16, running transversely, a $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 17 being bolted to Angle Girder 12 to cover the bow. The space between each compound girder 5 and nearby Strip Plates 13 and 14 is enclosed by five $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates, suitably overlapped, the final forward corner of the deck being covered by a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Triangular Flexible Plate 18. The space between each Girder 9 and respective compound girder 5 is enclosed by a $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate 19 extended by a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Triangular Flexible Plate 20, one securing Bolt helping to fix a Double Bent Strip 21 to the underside of the deck, as shown. Two $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 22 are bolted between Girders 9, at the same also fixing a $5\frac{1}{2}$ in. Strip 23 between the Girders. Bolted to this Strip and to left-hand Girder 9 is a 3-12 volt Motor with Gearbox, output shaft rearwards. This unit will later drive the paddle wheel. The deck is extended outwards and upwards at each side by two $12\frac{1}{2}$ in. Flat Girders 24 attached to the deck by Obtuse Angle Brackets.

Saloons and Deck Houses

In constructing the model, it is best to build up the saloons and deck houses separately, fitting them to the main deck when completed. Starting with the forward deck house, two $7\frac{1}{2}$ in. Angle Girders 25 are connected together by two $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plates, overlapped seven holes and extended forward by two overlapping Semi-circular Plates joined at their apeces by a $2\frac{1}{2}$ in. Curved Strip. Attached to each Angle Girder 25 are four 3 in. Angle Girders 26, positioned as shown, the forward securing Bolts also fixing a shaped $5\frac{1}{2}$ in. Strip 27 between Angle Girders 25. Bolted between the first and second Angle Girders 26 at each side are a $2\frac{1}{2}$ in. Strip and a $2\frac{1}{2}$ in. Angle Girder 28, the securing Bolts also holding a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate in position. Bolted between the third and fourth Angle Girders 26 are a $3\frac{1}{2}$ in. Strip and a $3\frac{1}{2}$ in. Angle Girder 29, the securing Bolts also holding two overlapping $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates in position. Note that Girders 28 and 29 are bolted to the lower ends of Girders 26. The back of the deck house is supplied by a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Plastic Plate 30 and a $3\frac{1}{2}$ in. Angle Girder, bolted between rear Girders 26 at each side.

In the case of the after deck house, two $7\frac{1}{2}$ in.

Angle Girders 31 are again connected by two overlapping 5½ × 3½ in. Flat Plates, but only three 3 in. Angle Girders are bolted to each of them, one at each end and one through the fifth hole from the back. The first and second Girders are connected by a 5½ in. Strip, a 5½ × 1½ in. Flexible Plate and a 5½ in. Angle Girder 32, these three parts also being connected to Angle Girder 31 by a 3 in. Strip 33. Both the front and rear of the deck house are enclosed by a 3½ × 2½ in. Plastic Plate and a 3½ in. Angle Girder, bolted between the respective upright 3 in. Angle Girders.

When completed, the deck houses are secured to the upper deck by means of Angle Girders 28, 29 and 32, etc., the deck itself being built up from three 12½ × 2½ in. Strip Plates 34, extended forward by three 9½ × 2½ in. Strip Plates 35. Note, however, that the two centre Plates are overlapped three holes, while both pairs of outside Plates are overlapped only one hole. The forward ends of Plates 35 are connected by a 5½ × 2½ in. Flat Plate 36, the securing Bolts also holding an extension to each corner of the deck in place. Each extension consists of a 3 × 1½ in. Flat Plate 37, a 2½ × 1½ in. Flexible Plate 38 and a Semi-circular Plate 39. A 23 in. compound angle girder 40 is bolted to each side edge of the deck, as shown, each compound girder being built up from two 12½ in. Angle Girders overlapped four holes.

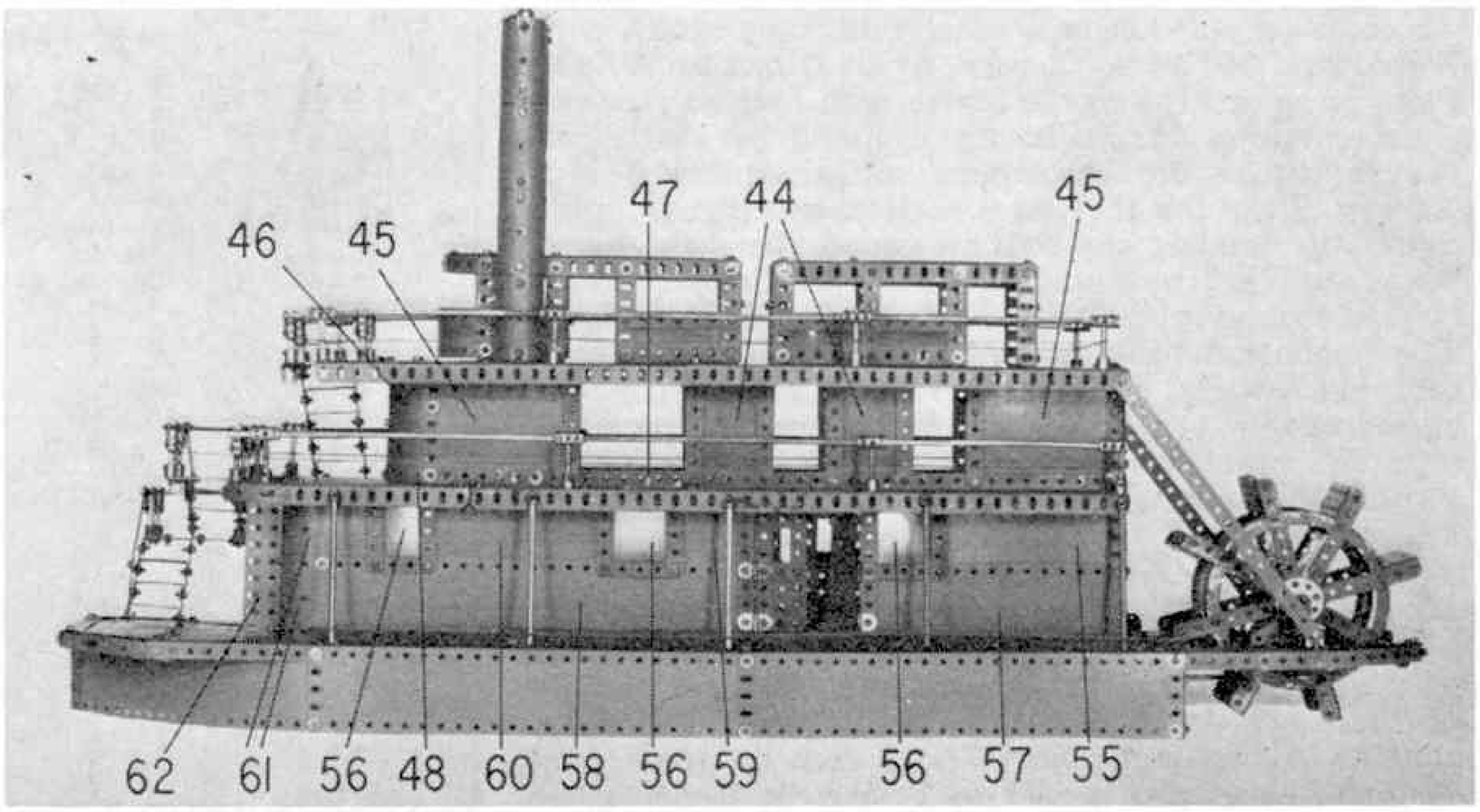
Coming to the upper saloon, two 20 in. compound angle girders, each built up from an 18½ in. Angle Girder extended by a 2½ in. Angle Girder, are connected together at the rear end by a 4½ in. Angle Girder 41, the other end of each girder being extended forward by a Formed Slotted Strip, the Slotted Strips at each side being connected by a 2½ in. Strip, with the securing Bolts also holding two vertical 3½ in. Strips 42 in place to serve as the forward entrance way. Bolted to each compound girder are two 3½ in. Angle Girders 43, one at each end, six 3½ in. Strips, two 3½ × 2½ in. Flexible Plates 44, two 4½ × 3½ in. compound flexible plates 45, each built up from two 4½ × 2½ in. Flexible Plates, and a 3½ × 2½ in. compound curved plate 46, the latter built up from two 2½ × 2½ in. Curved Plates. The compound curved plate follows the contours of the Formed Slotted Strip and it is also bolted to Strip 42.

The positions of the other Strips and Plates are evident from the illustrations, and it will be seen that they are arranged leaving gaps in the side walls to represent windows. The lower ends of the Strips and Plates are connected by another 20 in. compound angle girder 47, as shown, this girder again being extended forward by a Formed Slotted Strip 48. These Formed Strips at each side are bolted to Strips 42, at the some time fixing a 2½ in. Strip 49 in place between them. The rear ends of compound girders 47 are connected by a 5½ in. Angle Girder 50, while the back of the saloon is completed by a 4½ × 2½ in. Flexible Plate 51, bolted to Angle Girders 43.

This brings us to the lower saloon, each side of which consists of two 23 in. compound girders 52 and 53 connected together by two 4½ in. Angle Girders 54, one at each end, and three 4½ in. Strips, at the same time fixing in position a 5½ × 2½ in. Flexible Plate 55, three 2½ × 2½ in. Transparent Plastic Plates 56, a 7½ × 2½ in. Strip Plate 57, a 12½ × 2½ in. Strip Plate 58, a 2½ × 2½ in. Flexible Plate 59, a 5½ × 2½ in. Flexible Plate 60 and two 5½ × 2½ in. Plastic Plates 61. The Transparent Plastic Plates, of course, serve as windows, the two forward Plates being edged by Perforated Strips to serve as window frames. Plastic Plates 61 are curved round, as shown, and bolted to a 4½ in. Angle Girder, which will later be bolted to the centre deck. Secured to the spare flange of this Angle Girder is a 4½ in. Flat Girder 62. Note, incidentally, that forward Angle Girder 54 is hidden from view behind Plates 58 and 61. The rear of the saloon is enclosed by four overlapping 3½ × 2½ in. Flexible Plates overlaid by three 6½ in. compound strips 63, all bolted to rear Angle Girders 54.

Two sets of double doors are provided each side of the saloon, each door being built up from two 3½ in. Strips 64 and a 2 in. Strip 65, connected at top and bottom and in the centre by 1½ in. Strips. The doors are attached to the appropriate 4½ in. Strips in the saloon sides by two hinges in each case.

Built onto the top of the lower saloon is the centre deck, this consisting of eight 12 × 1½ in. Strip Plates extended forward by two 5½ × 1½ in. Flexible Plates 66 (overlapped nine holes) and two Semi-circular Plates 67, the securing Bolts also fixing a 7½ in. Strip 68 to the underside of the Plates. Plates 66 are edged at the front by a 6½ in. compound angle girder 69 built up from two 3½ in. Angle Girders and held in place by Rod Sockets instead of Nuts and Bolts, two of the Rod Sockets also fixing a 2½ × 2½ in. Flat Plate



A side elevation of the Steamboat showing its realistic shape, "looking for all the world like a floating hotel or barn."

70 in position. The deck is edged at each side by an 18½ in. Angle Girder 71 and a 5½ in. Angle Girder, the latter extended by a Formed Slotted Strip 72 to connect with compound girder 69. The deck, of course, is attached to the top of the saloon by means of compound angle girders 52. Once it is in place, Flat Girders 62 are secured to the underside of Strip 68 by Angle Brackets, then the upper saloon can be added by bolting compound girders 47 to the deck. After this, the upper deck, with the deck houses, can be secured to the top of the upper saloon by bolting it to the upper 20 in. compound angle girders, with bracing 9½ in. Strips being secured between the rear end of each compound girder 40 and an Angle Bracket attached to the lower deck. Imitation stays between the centre and lower decks are supplied by 4½ in. Rods 73, the lower ends of the Rods projecting through the outer row of holes in Flat Girders 24 and the upper ends being held in Collars secured to compound girder 71.

At the front end of the model, sets of stairs, or "companionways", are provided, running from deck to deck. The upper companionway, running between the centre and top decks, is provided by two 4½ in. Narrow Strips, attached to the underside of left-hand Flat Plate 37 by Angle Brackets. Upper deck guard rails around the companionway "well" are provided by suitable Rods held in the end transverse bores of Couplings fixed on the ends of 1 in. Rods carried in Rod Sockets secured to the deck. Note that the front Rod Sockets secure two 1½ in. Angle Girders 74A to the underside of the front edge of the deck and note also that a 2 in. Screwed Rod 75 must be used for one of the guard rails, the appropriate bores in the two nearby support Couplings being threaded. Guard rails round the remainder of the deck are again supplied by suitable Rods held in Couplings on 1½ in. Rods also fixed in Rod Sockets secured to the deck.

The lower companionway between the lower and centre decks is built in two sections with a "landing" in between. The upper section is supplied by two 2½ in. Narrow Strips connected by two 1½ × ½ in. Double Angle Strips, while the lower section is made up of two 3½ in. Narrow Strips connected by three 1½ × ½ in. Double Angle Strips. A 3 × 1½ in. Flat Plate 76 serves as the landing, the upper companionway being attached by Angle Brackets and the lower companionway being attached to the lugs of a 1½ × ½ in. Double Angle Strip bolted to the underside of the Plate. At its top end, the upper section is attached to compound angle girder 69 at one side, the other side being attached to Flat Plate 70 by a Corner Angle Bracket 77, the Plate being secured to the centre deck by Rod Sockets. Companionway handrails are supplied by two 3 in. Narrow Strips for the upper section and a 3½ in. Narrow Strip for the lower section, with guard rails round the landing, as well as round the deck, again being supplied by suitable Rods and Screwed Rods held in Couplings on short Rods fixed in Rod Sockets. The lower end of each outside companionway handrail, incidentally, is supported by a 2 in. Strip 78, as shown.

Paddle Wheel and Funnels

All that now remains to be built is the paddle wheel and the two distinctive smokestacks—items which are deliberately left until last to avoid the possibility of them being damaged during assembly of the main parts of the model. The paddle wheel consists of two Hub Discs 79, to each of which four 3½ in. Strips, inter-spaced by four 3 in. Strips radiating outwards, are bolted, at the same time fixing an 8-hole Bush Wheel to the centre of the Hub Disc. The end of each Strip attached to one Hub Disc is then connected to its opposite number on the other Hub Disc by two 3½ × ½ in. Double Angle Strips 80 these Double Angle Strips, of course, serving as the actual paddles.

The completed assembly is fixed on a 5 in. Rod journalled in two Flanged Brackets 81, one bolted to each protruding rear "wing" of the lower deck. Three Washers space the paddle wheel from the right-hand Flanged Bracket. Fixed on the right-hand end of the paddle wheel axle is a ⅞ in. Bevel Gear 82 which meshes with a similar Bevel Gear on a 2 in. Rod journalled in the deck plates and in Double Bent Strip 21 and held in place by a Collar. Mounted on the lower end of this Rod is a ½ in. Pinion which engages with a Worm 83 on an 11½ in. Rod journalled in right-hand Flexible Plate 7 as well as in a 1½ in. Corner Bracket 84, bolted to rear Girder 8, and in a 1½ in. Strip bolted to a 1 × 1 in. Angle Bracket 85 secured to the underside of right-hand Girder 9. A Collar holds the Rod in place. Secured on the Rod is a 1 in. Sprocket Wheel 86 which is connected by Chain to a ¾ in. Sprocket Wheel on the Motor output shaft.

In the case of the smokestacks, each of these is similarly built up from four Cylinders connected together by two 9½ in. Strips bolted down the insides of the Cylinders. Four Obtuse Angle Brackets 87 are carried at the top of each Chimney, three of the Brackets being bolted directly to the top Cylinder and the fourth being bolted to a 1 × ½ in. Angle Bracket 88, held in place by the Bolt fixing the centre of the first three Obtuse Angle Brackets in position. The fourth Obtuse Angle Bracket could, of course, be bolted directly to the Cylinder, but Angle Bracket 88 partially covers the end of the Chimney to represent a cinder trap. Both chimneys are connected together by two 2½ in. Curved Strips 89, attached to the Chimneys by Angle Brackets, a 1 in. Triangular Plate being bolted to the centre of the Curved Strip for additional effect. The chimneys are each attached to the upper deck by a 1 × ½ in. Angle Bracket 90 to complete a large but extremely impressive model.

PARTS REQUIRED

6—1a	4—12b	12—59	30—179
2—1b	18—12c	30—63	10—188
3—2	1—13	1—70	15—189
8—2a	6—13a	1—72	2—190
38—3	6—14	3—73	4—190a
10—4	1—14a	1—74	6—193a
16—5	10—15a	1—77	3—194b
9—6	2—15b	5—81	4—194c
13—6a	4—16	1—82	1—194d
4—7	1—16a	4—89b	3—195
10—7a	3—17	3—90	6—196
6—8	16—18a	1—94	22—197
8—8a	18—18b	1—96	4—200
4—8b	1—26	1—96a	2—213
11—9	2—30	4—103b	6—214
6—9a	1—32	2—103c	10—215
12—9b	558—37a	2—111	8—216
14—9c	558—37b	2—111c	2—221
10—9d	156—38	8—114	2—226
2—9f	1—45	2—118	2—235
2—10	10—48	1—133	1—235a
19—12	16—48b	1—139a	4—235b
1—12a	4—52a	1—139b	2—235d
		1—154a	1 Motor with 6-speed Gearbox

LIVE MUSEUM OF STEAM RAILWAYS

By ARTHUR GAUNT



THE STRANGE SIGHT of a steam locomotive being trundled slowly along a Norfolk road on a giant transporter aroused much public interest in August, 1968. Eight steering axles enabled the carrier to be manoeuvred from Diss station to Bressingham.

The "cargo" was the 143-ton *Oliver Cromwell*, a 4-6-2 Britannia Class Pacific engine bearing the number 70013. It was to have its useful life extended by being added to the Museum of Steam founded in 1961 by Mr. Alan Bloom, of Bressingham Hall.

The *Oliver Cromwell* had already been accorded a distinction, having been chosen to head the last steam-hauled B.R. train to run on the Liverpool-Carlisle line on August 11 in the same year.

It had then travelled light to Norwich—and that trip was a further historical event, for this locomotive had started its regular career there when it arrived brand new in 1951. From Norwich it was towed to Diss station for completion of its journey to Bressingham by road.

Thundersley, a fine example of a 4-4-2 express tank engine built by a firm with an honoured name in rail transport development (Robert Stephenson & Co. Ltd., of Darlington) was also moved to Bressingham.

This engine was chosen to be specially restored and decorated for the Coronation of King George V in 1911. It received VIP treament again in the centenary celebrations of the London, Tilbury & Southend Railway, having served that line for 47 years.

After taking part in these commemorations this doyen of the L.T. & S.R. was stored by British Rail, but its care and subsequent renovation were undertaken by the Norfolk Railway Society. In this way members of that organisation obtained helpful insight into looking after steam-driven railway engines.

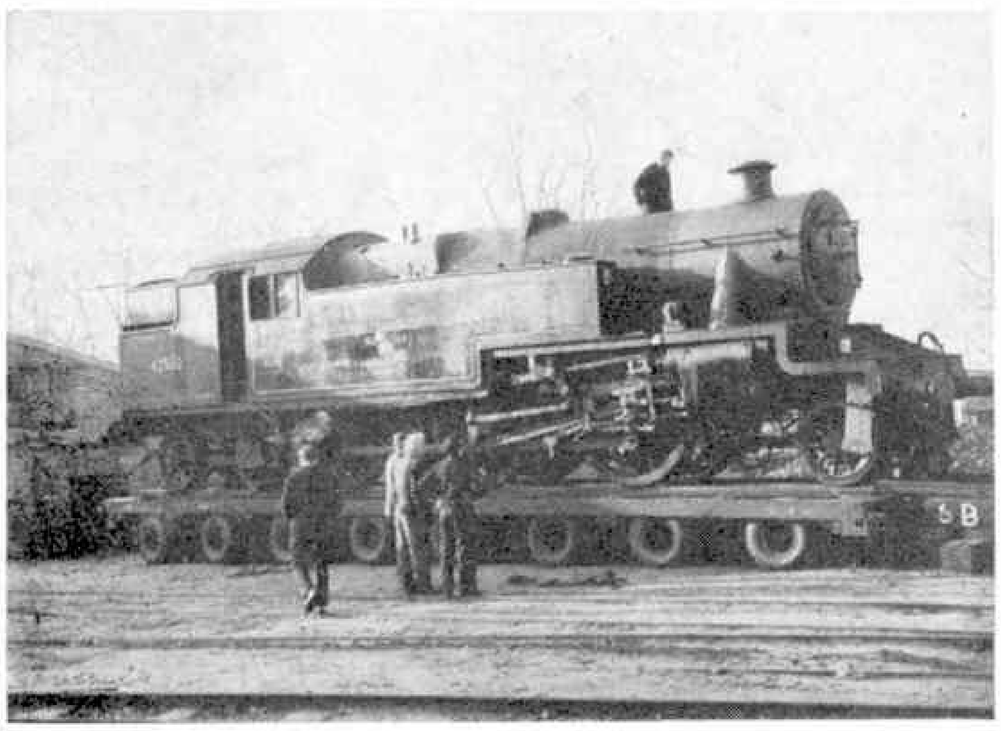
Now on permanent loan to the Bressingham railway museum, *Thundersley* was re-tubed by volunteers in 1969 and is in first-rate mechanical and steaming condition today.

An example of the type which preceded it, an 85-ton three-cylinder 2-6-4 tank locomotive built in 1934, and numbered 2500 for service with the L.T. & S.R. section of the L.M.S., has also been given.

There are now thirteen railway locos cared for on this Norfolk property. Road traction engines in working order are also to be seen there, and although there are other preservation societies concerned with souvenirs of steam transport, the Bressingham collection is the only one in Britain where exhibits of both rail and road engines are maintained as "live" ones.

The thirteen locomotives comprise seven standard gauge ones, a one-metre gauge engine, four 2 ft. gauge examples, and a 9½ in. gauge engine.

This singular but attractive and instructive enterprise arose in a fortuitous way. Needing a hobby in direct contrast to his horticultural activities at Bressingham, Mr. Bloom turned to steam transport, chiefly because a favourite Burrell traction engine named *Bella* came to an untimely end in 1950.



Heading picture shows *Oliver Cromwell* on Bressingham track in late 1968. Left: No. 2500 on arrival, on loan from B.R.



This useful engine was sold for scrap during his absence, and for more than ten years it was not replaced. In 1961, however, another Burrell, named *Bertha*, was bought for use on the estate.

Many of the visitors who came to enjoy the Bressingham gardens at that time expressed pleasure on seeing *Bertha*, and it soon became clear that most people have nostalgic memories of steam travel. From this circumstance emerged the idea of forming a collection not only on show but also in operation, and including railway engines as well as traction engines.

By the end of 1961 eight railway locomotives were brought to Bressingham, though they were mostly in a sorry state. Restoring them promised to be formidable, but volunteers with engineering knowledge and experience helped railway "fans" to take on the job.

More progress in establishing the working museum occurred when a small 9½ in. gauge locomotive called *Princess* joined the collection. A 750-yard track was laid alongside the gardens, and the mini line proved so popular that other developments were encouraged.

Most visitors wanted to see the widely spread nursery gardens, yet sightseers could not be allowed to wander there at will, lest the plants be damaged.

To overcome the problem a 2 ft. gauge railway has been constructed. Skirting the two-acre lake, and going alongside the beds where some 600,000 plants are grown, this facility has enabled visitors to obtain enthralling views of the gardens which they could not enjoy previously.

The original half-mile track has since been extended, and today it has a length of nearly three miles. It has historical links with other narrow-gauge railways, too, for the rails were brought from a quarry line in Wales and from a cement works track.

The rolling stock includes a number of "toast rack" coaches formerly used by miners at Penrhyn slate quarries. Three locomotives (named *George Sholto*, *Gwynedd*, and *Bronwllyd*) were purchased as well. They were augmented by the *Doll*, an 0-6-0 tank engine used previously by Stewarts and Lloyds, Bilston.

Efforts to run the *Doll* as a passenger train engine at Bressingham proved mysteriously unsuccessful. Though the locomotive itself kept on the track, the coaches it was hauling became derailed on curves.

A closer inspection of the *Doll* revealed that its gauge was slightly wider than it was thought to be. Consequently the engine was pressing the track outwards on curves, and the coaches behind were unable to stay on the lines.

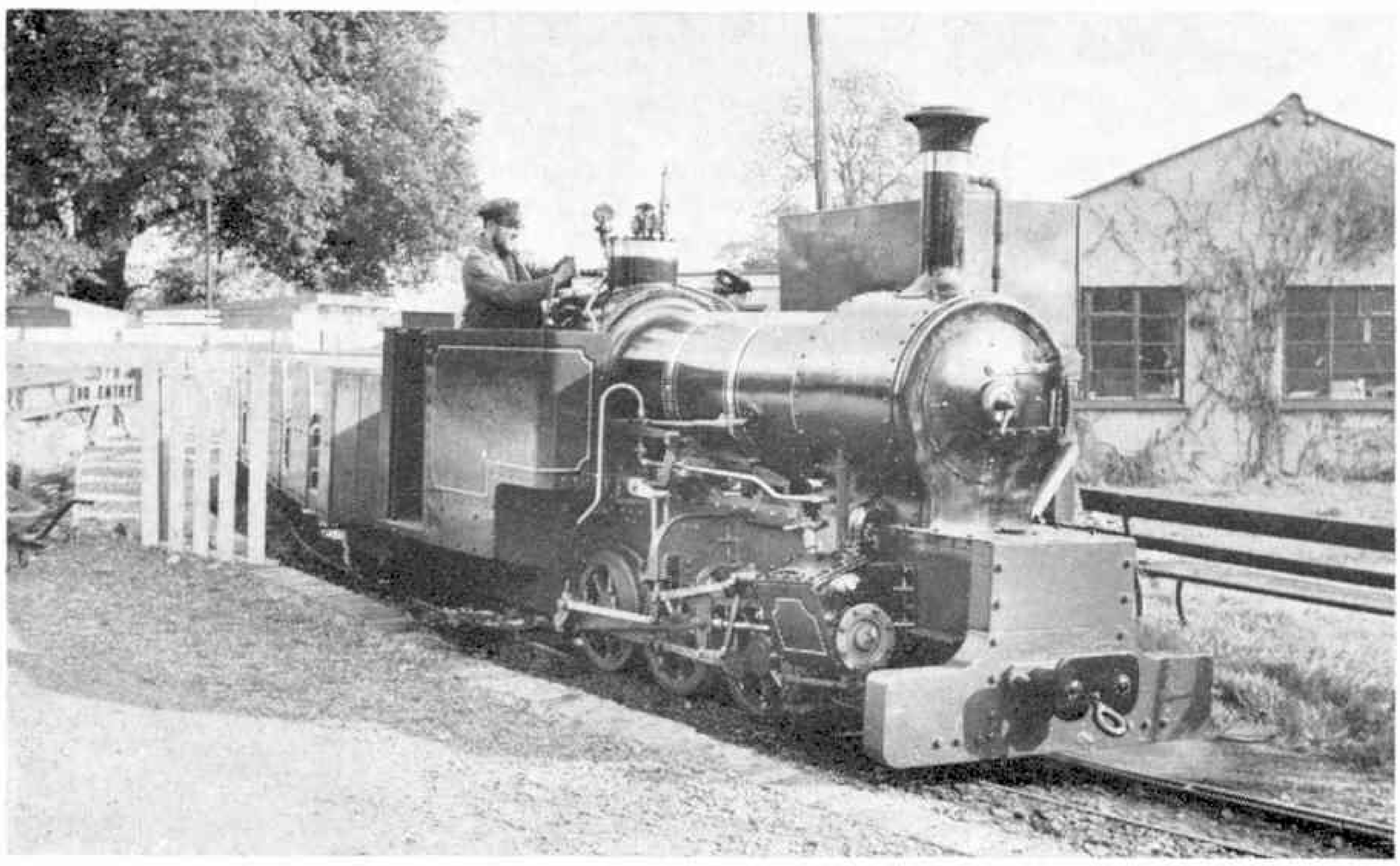
The loco concerned was therefore put up for sale and was bought by the Iron Horse Railway, Leighton Buzzard, Beds.

The metre gauge engine *Banshee* has been given a place in the museum, but it is now a static exhibit. It is one of three which ran on a mineral line near Wellingborough, Northamptonshire.

Outside bodies have helped to form the Bressingham collection. A 25-ton saddle tank standard gauge locomotive, *Beckton 25*, now on permanent loan there, served as an industrial engine and spent some years with the famous Bluebell Railway in Sussex, before being presented to the Industrial Locomotive Society for preservation.

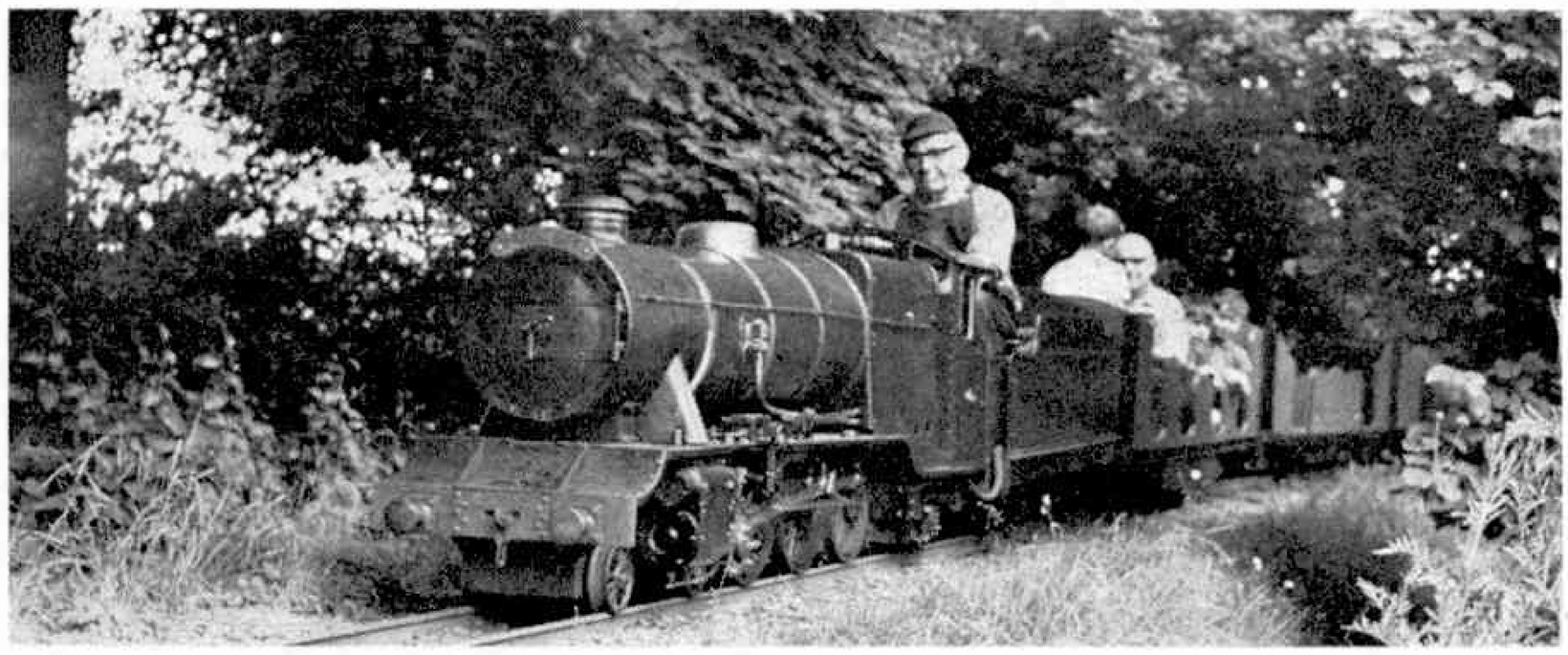
The I.L.S. has also lent a chain-driven *Sentinel* to the Bressingham collection. This standard gauge engine was first used by the South Eastern Gas Board, but was eventually given to the I.L.S. That organisation in turn had it moved to Bressingham.

The exhibits there include Britain's sole surviving standard gauge Garratt type locomotive, *William*

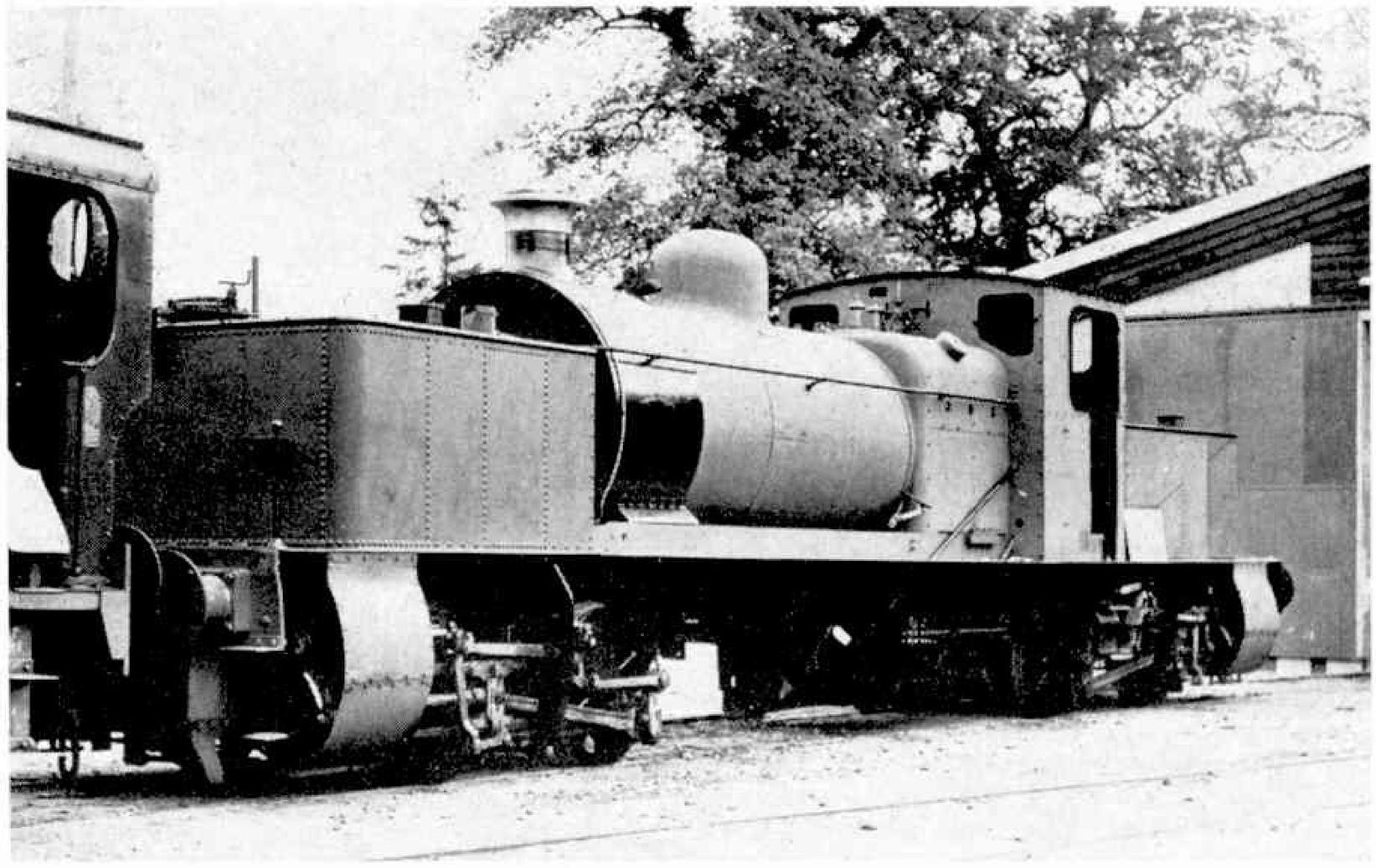


Above: *Thundersley* **on the road from Diss to Bressingham.**

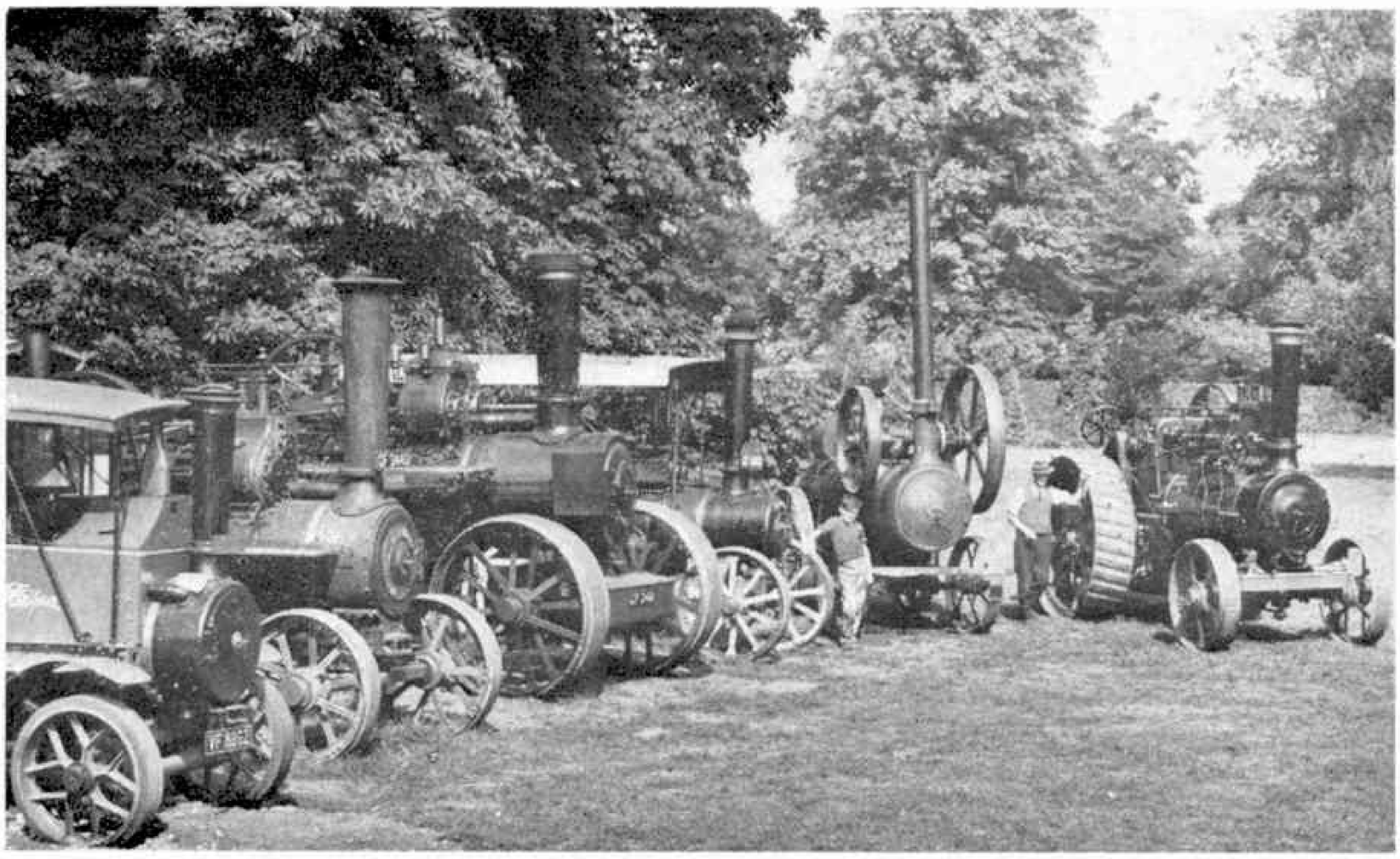
Left: *Bronwllyd*, **a Hudswell Clarke chassis rebuilt by the museum in 1969, using the boiler from K.S.** *Stanhope*.



The first locomotive at Bressingham was this 9½ in. gauge *Princess* Pacific.

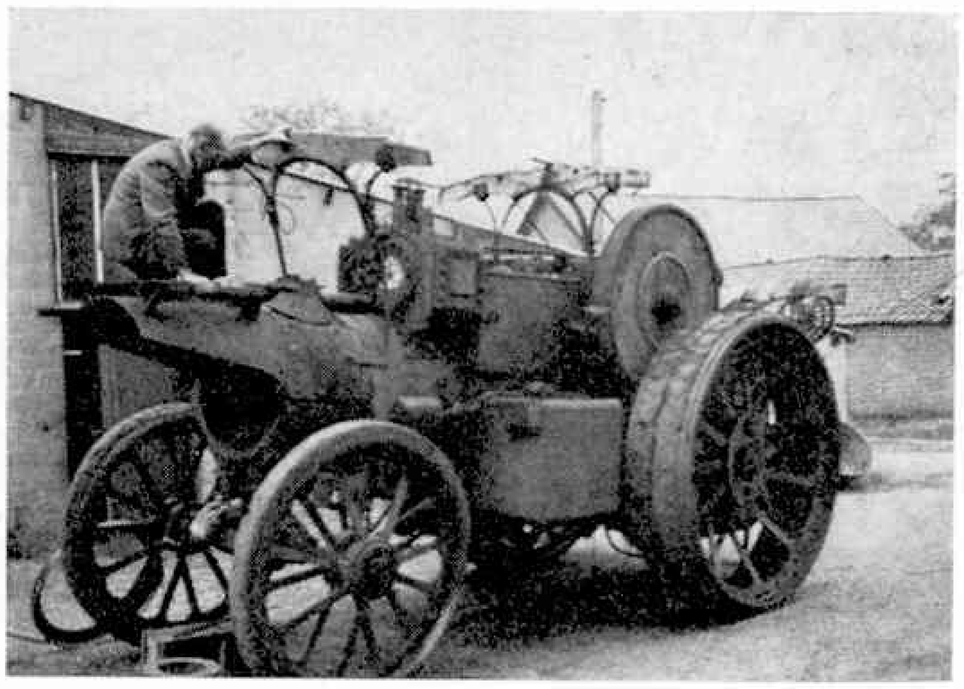


The Beyer-Peacock Garratt, the only such standard gauge engine in England, with its restoration nearly complete. This locomotive was owned by the Coal Board.



Not only locomotives are preserved by the museum, as this fine group of traction engines and road vehicles indicates.

Black Prince, **a one-time showman's engine, as it arrived at Bressingham for restoration.**



Francis. Built on an articulated chassis, it was designed for heavy loads up steep gradients and round difficult curves. It was named after the mine owner William Francis Dugdale.

When *Bronwllyd* first reached Bressingham from Penrhyn, it was a scrap chassis with no boiler. To put this relic into operational order a boiler from another scrap locomotive was installed. A Hudswell Clarke loco built in 1930, the Welsh-named engine was stripped and rebuilt with this second-hand boiler.

The Hunslet *George Sholto*, built more than sixty years ago, was the first locomotive to be used for regular passenger services on the nursery railway at Bressingham.

In May 1969 a new railway route was opened on the estate. Known as the Woodland Line, it gives visitors an opportunity to travel through a somewhat inaccessible area. The first steam-hauled trip along this mile-long line was made on a special "open" day by 500 passengers brought from London to Diss by the *Flying Scotsman*.

Plans for the near future include laying a new track half-a-mile long and with a $10\frac{1}{4}$ in. gauge. It will give visitors an opportunity to make a new scenic ride round the lake.

Probably the most unexpected feature of this pleasant haven for steam locomotives is that diesel transport has intruded there! A diesel shunter has been introduced, but it is used solely for the nursery business, track repairs, and suchlike jobs.

Steam railway enthusiasts need not fear that the Bressingham collection of steam locomotives will be diluted with more diesels.

A touch of gaiety is added to the scene by Mrs. Bloom's steam roundabout with an organ. This fairground souvenir is 90 years old, and after many years of travelling and giving joy to children and teenagers up and down the country, it has found a permanent site at Bressingham.

OPENING TIMES

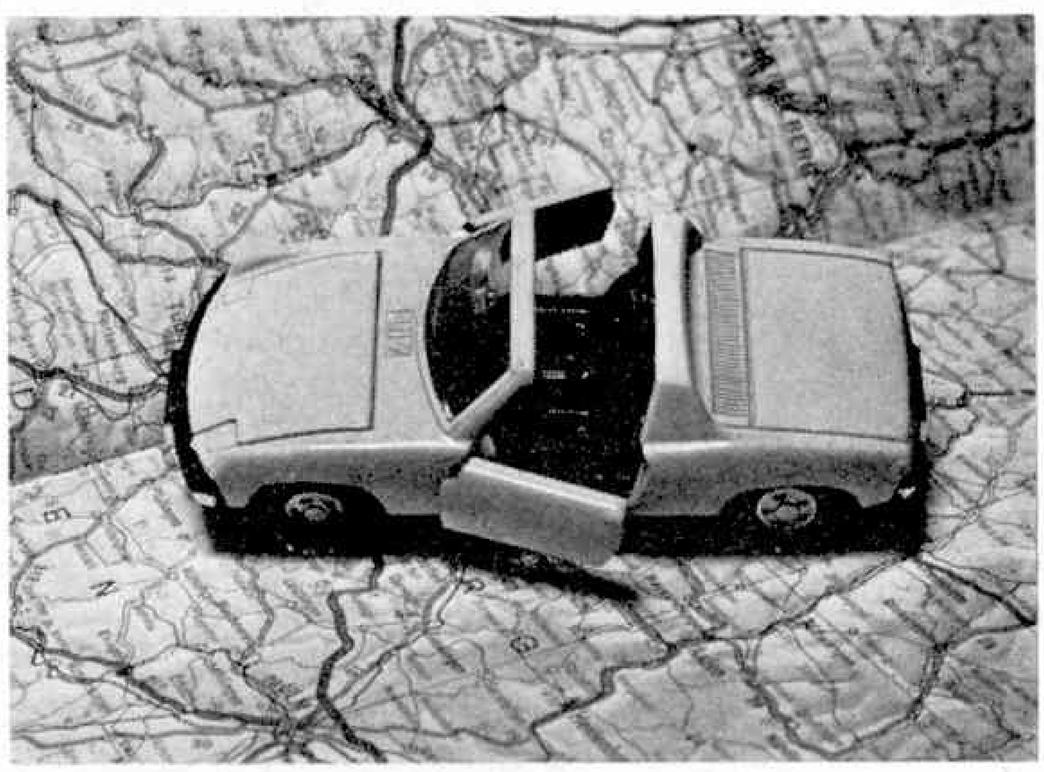
First Sunday in May to First Sunday in October, inclusive: 1.30 p.m. to 6.30 p.m.
Bank Holidays in that period.
Third Thursday in May to third Thursday in September: 1.30 p.m. to 5.30 p.m. (Restricted steam activity on Thursdays).
Not open at other times except first Sunday afternoons in each month, November to April inclusive.

DINKY TOY NEWS (*Continued from page 227*)

plants—a 4-cylinder, 1.7 litre capacity unit developing 80 Horse Power, or a 6-cylinder 2 litre capacity unit which develops 110 Horse Power. The former gives the car a top speed approaching 110 m.p.h., while the 6-cylinder unit results in a maximum speed of almost 125 m.p.h.—figures which undoubtedly prove the "Sports Car" designation in the car's title, whichever engine is fitted.

The Dinky VolksPorsche, Sales No. 208, does not of course offer these speeds, but it certainly qualifies as "fast", thanks to the low-friction Speedwheels which are fitted. It reproduces all the "sporty" lines of the original and has its own model features, including opening doors and an opening bonnet, or, in this case, front luggage compartment lid. So snugly fitting is this lid, in fact, that a special "bonnet lifter" has been incorporated in the shape of a small button projecting through the baseplate. When pressed, this button raises the bonnet slightly to bring the edge free so that a finger can then be used to open the bonnet fully.

All the standard Dinky Toy features are present including windscreen, moulded seats, steering wheel and interior door panels, and German-style number plates. The final touch is supplied by an immaculate colour-scheme of yellow body, contrasting well with bright-plated bumper inserts, black baseplate and black interior fittings. The overall effect is striking, making the model a "must for serious collector and youngster alike".

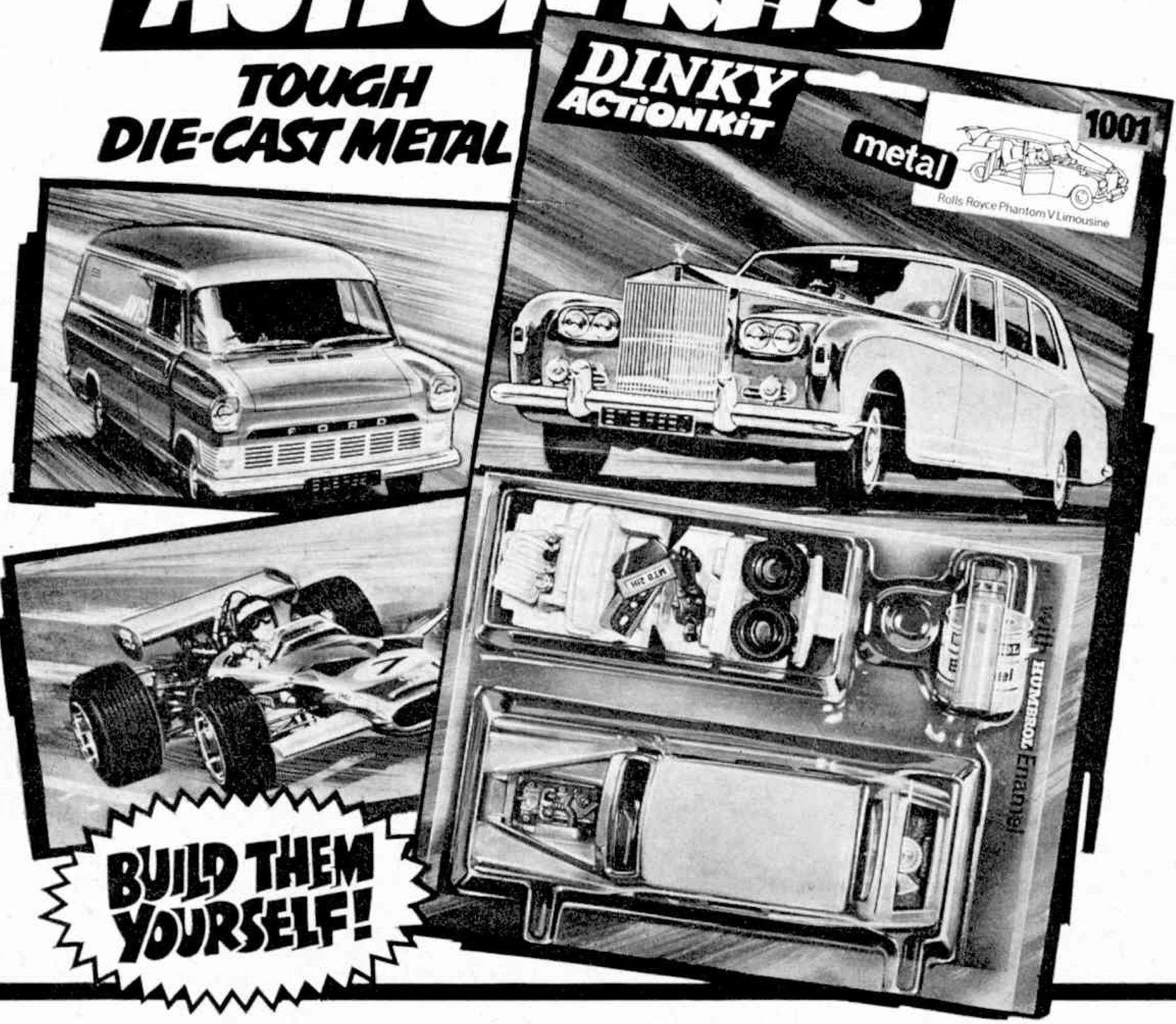




The new VW-Porsche 914 Sports Car from Dinky, based on a fast 2-seater manufactured by Volkswagen-Porsche of Stuttgart, Germany. On the real car, the open cockpit would be enclosed by a removable hardtop which could be stowed in the boot during open motoring.

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WANTED

Wanted. Toy soldiers by Britains Ltd. also their horse-drawn vehicles, trucks, tents, buildings and airplanes. Write E. P. D'Andria—3410 Geary Blvd. Suite 343, San Francisco, California 94118. NOPQ

Pre-War model trains sought by Lowke, Marklin, Bing, etc. O or larger also tinplate toys — 10 Church Hill, Patcham Village, Brighton 553940. T/C

Wanted. Dinky Aircraft, pre-war, no fatigue, mint and boxed, especially sets. Will pay top prices. Also Dinky pre-war empty aircraft boxing. Will pay 75p each and set boxing £3 each. Also wanted: Dinky Military figures, mint, no fatigue, boxed and *151-A, 151-C, 151-D, 152-C. Will pay $80.00 for absolute mint, no fatigue, model of *161-A Searchlight lorry. Write to—Michael Smock, 3623 N. Pulaski Road, Chicago, Illinois. 60618 U.S.A. MNO

Collector Urgently Requires for surprisingly high prices, any unusual cast iron and tin toy children's money-boxes made before 1950. I particularly want a "Footballer" moneybox, a "Tommy," "Queen Victoria," "Wimbledon," "Grenadier," "Volunteer," "John Bull," Sentry (tin), Giant, Clown, "Hoop-la," "Robot" (aluminium), Musical Bank, etc., but will consider any kind of money-boxes, especially those with working parts and moving figures. Exchange also considered against old toys, pre-war Meccano, etc. All letters answered so please write if you can help.—Haley, 5 Flushouse, Holmbridge, Nr. Holmfirth, Huddersfield HD7 1QD. H/S

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Free Gift to new applicants when requesting my discount approvals—A. Renner, A.D.P.S., 57 Warwick Road, Beaconsfield, Bucks. L/W

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Yachtsmen who have complained of the growth of A class yachts from 50-60 lb. to the modern 80-90 lb. monsters can take heart from the design published in April's *Model Boats*—it is a competitive A boat that weighs only 35 lb.! Other yachting articles cover sailmaking with modern materials—much simpler than it used to be—more on fittings and basic R/C yachting.

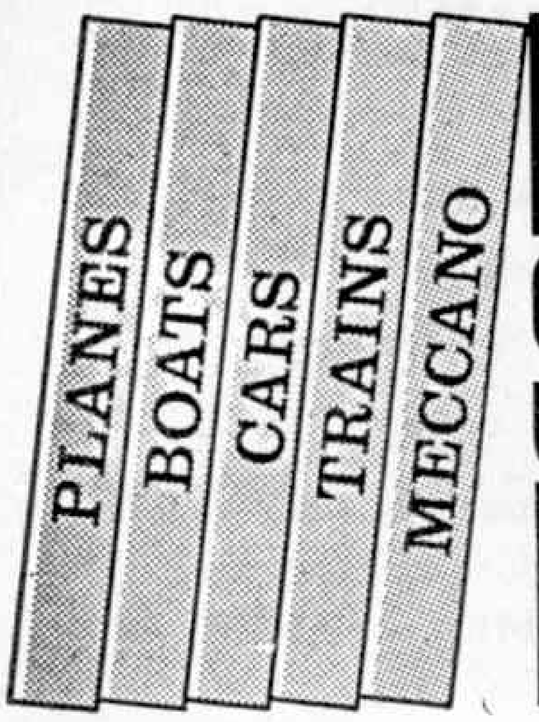
Power boaters have more gen on electric boats in "Electric Scene," a very popular alternate-month series, plus a drawing of Merlotti's Italian and European record-holding 10 c.c. speed model.

For scale builders there are notes on small scale fishing craft details, a model of the *Titanic*, the aircraft carrier *Ark Royal*, warship davits, etc.

In addition, regular features such as The Secretary Writes, Test Bench, Readers Write, etc., make their usual appearances.

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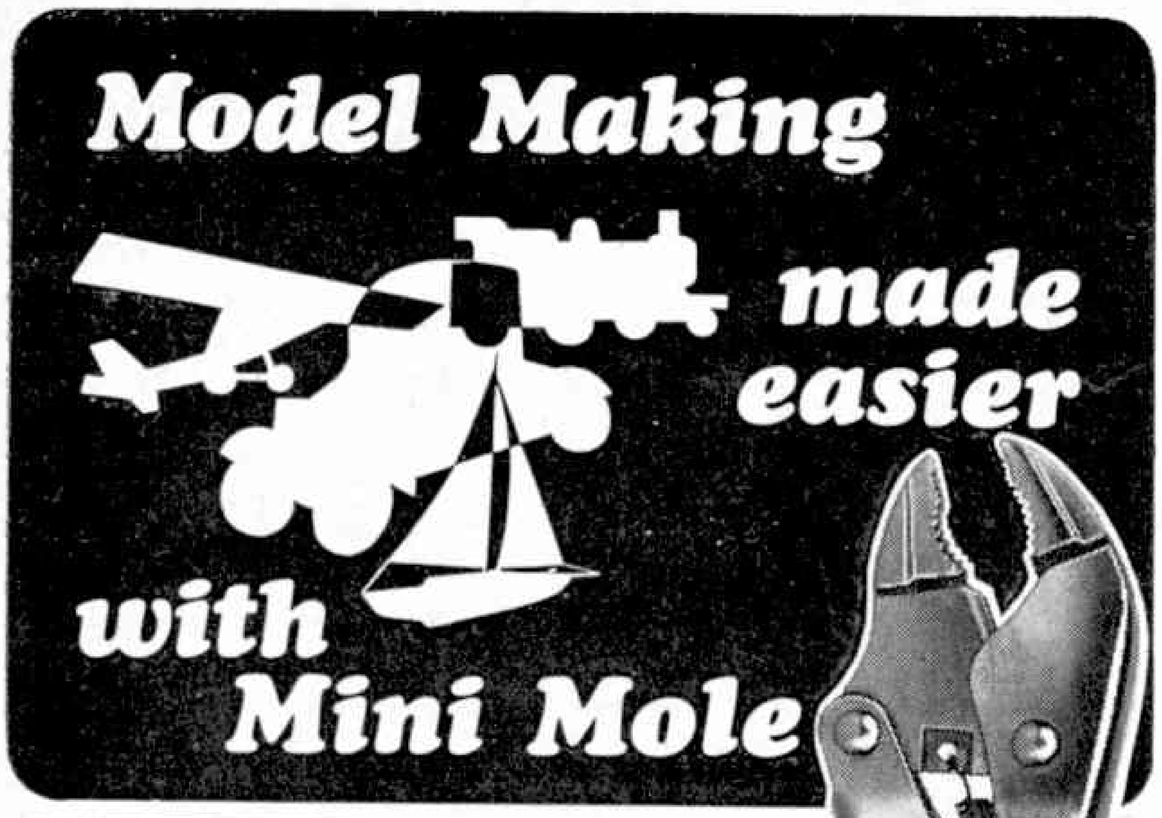
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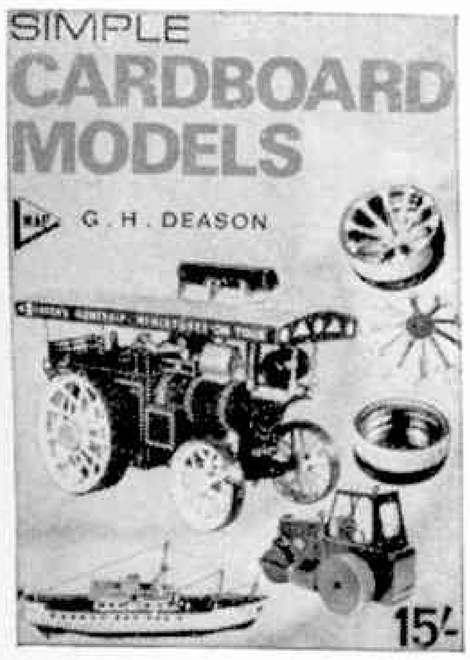


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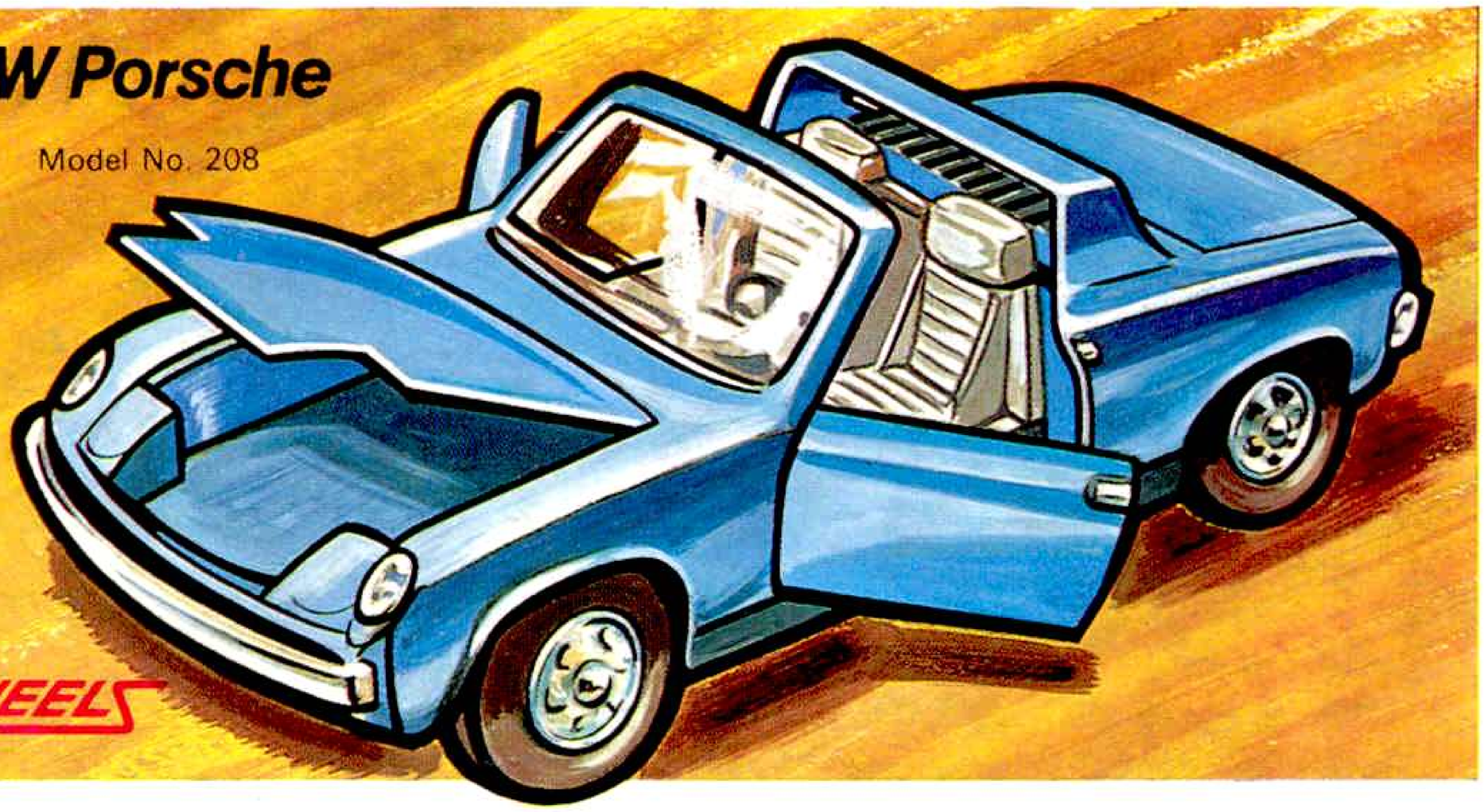
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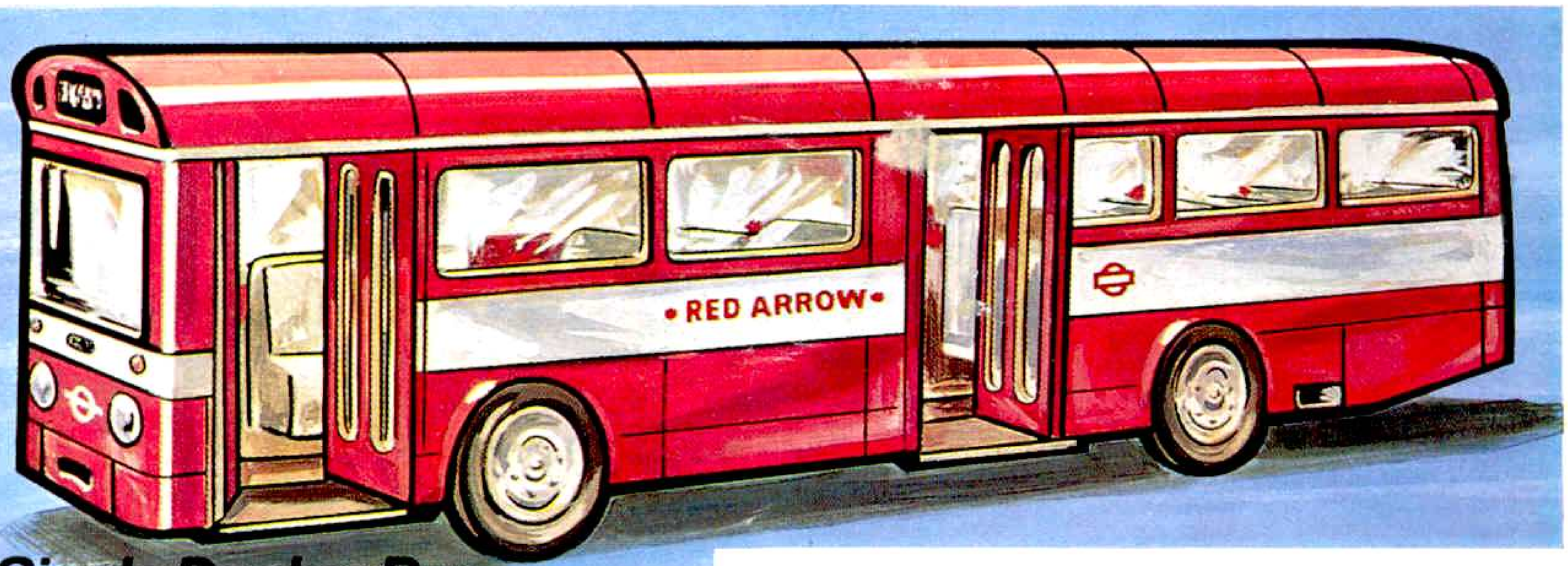
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